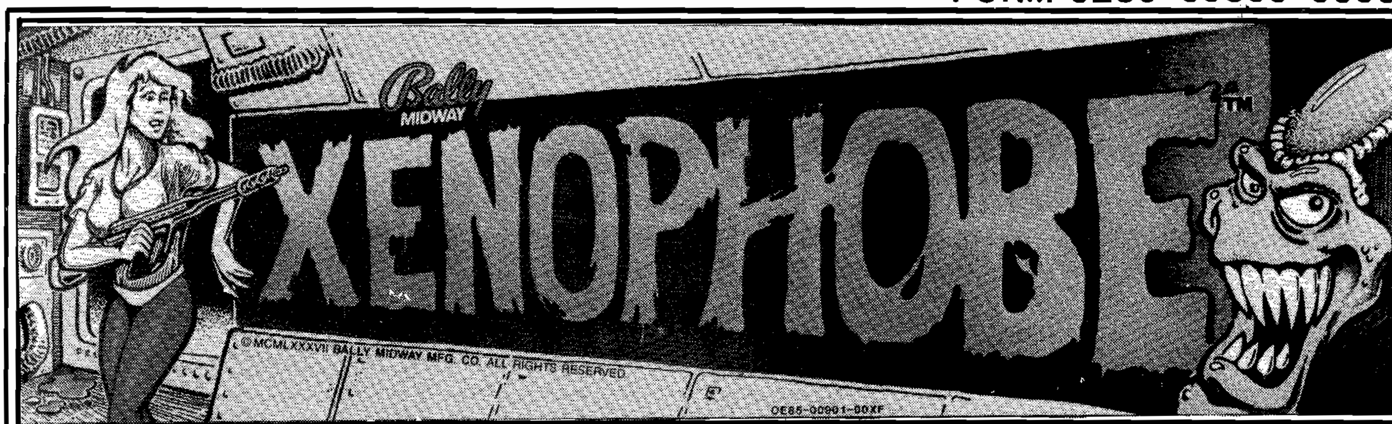
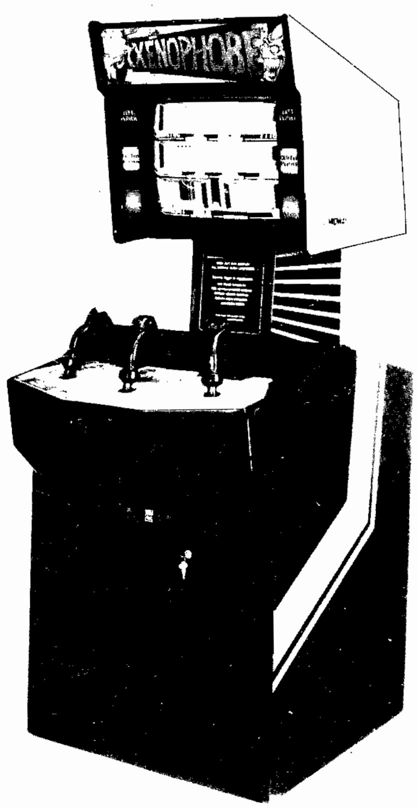
GAME NO. 0E85
FORM 0E85-00300-0000



Parts & Operating Manual



Bally
MIDWAY™
10601 W. Belmont Avenue
Franklin Park, Illinois 60131
U.S.A.

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WARNING

THIS GAME MUST BE GROUNDED. FAILURE TO DO SO MAY RESULT IN DESTRUCTION TO ELECTRONIC COMPONENTS.

WARNING: This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a CLASS A computing device pursuant to SUBPART J of PART 15 of FCC RULES, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

ELECTRICAL BULLETIN: FOR ALL APPARATUS COVERED BY THE CANADIAN STANDARDS ASSOCIATION (CSA) STANDARD C22.2 NO. 1, WHICH EMPLOYS A SUPPLY CORD TERMINATED WITH A POLARIZED 2-PRONG ATTACHMENT PLUG.

CAUTION: TO PREVENT ELECTRIC SHOCK DO NOT USE THIS (POLARIZED) PLUG WITH AN EXTENSION CORD, RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

ATTENTION: POUR PREVENIR CHOCS ELECTRIQUES NE PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR. UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS EN LAISSER AUCUNE PARTIE A DECOUVERT.

USE ONLY GENUINE BALLY MIDWAY APPROVED REPLACEMENT PARTS.

Printed in U.S.A.

XENOPHOBE U.R. - 3 PLAYER

TABLE OF CONTENTS

SECTION 1 - SYSTEM INFORMATION

SECTION 2 - ILLUSTRATED PARTS BREAKDOWN

SECTION 3 - COMPONENT LAYOUTS, SCHEMATICS & WIRING DIAGRAM

SECTION 4 - APPENDIX

LIST OF ILLUSTRATIONS

SAFETY

The following safety hints apply to all game operators and service personnel. Specific warnings and cautions will be found throughout this manual where they apply. We recommend that you read this page, and also all of Section 1, before preparing your game for play.

WARNINGS

AC POWER CONNECTION. Before connecting the game to the AC power source, verify that the "line voltage selection chart" jumper wires are installed correctly for the line voltage in your area. For details, refer to the Section 3.

PROPERLY GROUND THE GAME. Service Technicians and players may receive an electrical shock if this game is not properly grounded! To avoid shocks, do not plug in the game until it has been inspected and properly grounded. Bally Midway games should only be plugged into a grounded 3-wire outlet. Service Technicians & players may receive an electrical shock if the control panel is not properly grounded! After servicing any parts on the panel, check that the grounded wires are secure. Only then should you lock up the game.

DISCONNECT POWER DURING REPAIRS. To avoid electrical shock, disconnect the game from the AC power source before removing or repairing any part of the game. When removing or repairing the monitor, extra precautions must be taken to avoid electrical shock because high voltages may exist within the monitor circuitry and cathode ray tube (CRT) even after power has been disconnected. Do not touch internal parts of the display with your hands or metal objects! Always discharge the second anode from the CRT before servicing this area of the game. To discharge the CRT: attach one end of a large, well-insulated, 20-kV jumper to ground. Momentarily touch the free end of the grounded jumper to the anode by sliding it under the anode cap. Wait two minutes and discharge the anode again.

USE THE PROPER FUSE. To avoid electrical shock, use the replacement fuse which is specified in the parts list for this game. The replacement fuse must match the original fuse replaced in fuse type, voltage rating, and current rating.

HANDLE FLUORESCENT TUBE AND CRT WITH CARE. If you drop a fluorescent tube or CRT and it breaks, it may implode! Shattered glass can fly eight feet or more from the implosion.

CAUTION

PROPERLY ATTACH ALL CONNECTORS. Make sure that the connectors on each printed-ciruit board (PCB) are properly connected. If they do not slip on easily, do not force them. A reversed connector may damage your game and void the warranty. All connectors are keyed to fit specific pins on each board.

SECTION 1
GAME DESCRIPTION, GENERAL INSTRUCTIONS, OPTION SWITCH SETTINGS, & TROUBLESHOOTING PROCEDURE

GAME DESCRIPTION

Xenophobe (Zee-no-phobe)n. One who has a deathly fear of anything alien.

XENOPHOBE is a video science fiction adventure game that can be played by one, two, or three players simultaneously. This game has two objectives:

1. To exterminate hostile alien life forms (called "Xenos") that are infesting derelict space stations and moon bases.
2. To collect various forms of valuable hardware found at each derelict space station and moonbase.

Because of the fierce and frightening methods of attack by the Xenos, each player (as an Exterminator) quickly learns to fear these dangerous "pests".

On a horizontally mounted color monitor, a three-way split screen effect is displayed that gives each player a separate viewing area. Three separate coin slots, one for each individual player, are on the coin door. Three separate joystick controls, one for each individual player, are on the control panel. This game incorporates Bally Midway's JOIN THE ACTION feature.

JOIN THE ACTION - Each set of game controls include a corresponding start trigger, which is activated independently. This allows a player, after inserting the proper coinage, to begin play at any time including while the other sets of controls are in use.

In this game, the amount of each player's playing time is determined by the number of "life units" (each life unit = 1000 "health" points) purchased for the player-character. Each Exterminator is allowed to have no more than a maximum of 9,999 "health" points at any one time.

A "status line" (player's point status) is displayed toward the bottom of each player's viewing area. The health point total of each player's Exterminator is shown at the left end of the Status Line. Note that the total number of game points is displayed at the right end of the Status Line. Once the total number of "health" points displayed falls to zero, the player's Exterminator drops from exhaustion. The message "INSERT COIN TO CONTINUE" is displayed on the monitor screen across the player's viewing area. Unless proper coinage is added within a short period of time, the game ends for the player. Note that after the necessary coin(s) have been added in time, moving ANYTHING on the player's joystick control will revive the player's Exterminator.

During game play, the player's Exterminator will use weapons or "fists" when battling the Xenos. The trigger on each player's joystick control is used to fire a weapon or to throw a punch. The four-way joystick itself controls the Exterminator's direction of movement (left or right) and also controls the player-character's arm position (raised, level level or lowered) for punching or weapon firing. Each joystick control also has two thumb-buttons which control player-character actions and movements.

Game Description, Cont'd.

During game play, each player's Exterminator faces constant attack by Xenos of different types and sizes (see Figure 1 on page 1-4). Hand weapons used against the Xenos are the Phaser, the Laser Pistol, Lightning Rifle, and the Smoke Gun. Xenos cause player-character health point loss. Other hazards, like the Laserball and the Electrical Force Wall, also cause health point loss (see Figure 2 on page 1-5). Another weapon used by the player-character is the Bomb, a weapon object to be picked up and used only once. When the player uses a Fist, Hand-Weapons, or a Bomb to damage the Xenos and other player hazards, the player earns game points (see Figure 3 on page 1-6).

After inserting the proper coinage in one of the three coin slots, the player presses the left or right push button to select one of three different Exterminators (each from a different planet). Note that each joystick control offers a choice of three Exterminators for a game total of nine choices. The game begins when the player squeezes the "start" trigger of his (or her) joystick control. The player's viewing area, on the monitor screen, now displays the destination; a derelict space station or moonbases desperately in need of the Exterminator's special services. The size of these bases vary in the number of levels and the number of rooms per level (see Figure 4 on page 1-7). A "transfer disc" appears under the player's Mothership (or Shuttle) and then speeds towards the derelict.

As the molecules of each player's Exterminator reassemble in the transfer room of the derelict base, the player is immediately aware that the room is filled with green spore (or pods) of the alien pests. Traveling from room to room (and level to level), the player (or players) must accomplish the first objective: to exterminate the required number of Xenos in each level of the base within a certain length of time or else the pests will overrun the base. The length of time varies with the number of levels. The required number of Xenos to kill in each level also varies with the number of levels. The battle between the Exterminator(s) and the Xenos may result in three different outcomes:

1. Time runs out, the Xenos overrun the base, and the base self-destructs after the Exterminator(s) returns to the mothership(s) via the "transfer disc".
2. The player (Exterminator) orders a "fast-destruct" of the base to prevent it from being overrun by Xenos. The base is destroyed after the Exterminator returns to the mothership(s) via the "transfer disc".
3. The player (Exterminator) clears the base of Xenos. The Exterminator(s) return to the mothership(s) via the "transfer disc".

An "awards sequence" follows each outcome with 1000 points times the number of point value objects collected (except for the Phaser, Laser Pistol, Lightning Rifle, and Smoke Gun weapons) being added to the total game points. These objects and their game point valves accumulate from game rack to game rack throughout the entire game. Bonus game points and bonus health points are awarded as shown in Figure 5 on page 1-7.

The second objective of the player is to have the Exterminator collect valuable hardware. This hardware consists of weapon objects (worth game points), objects (which may or may not be worth game points or health points) that can be used by the Exterminator in the battle against the Xenos, and objects (with point value) that serve no purpose.

Game Description, Cont'd.

On the monitor screen, just below the Status Line in each player's viewing area, the words "LEFT BUTTON" and "RIGHT BUTTON" are displayed. During game play, directions will appear above "LEFT BUTTON" and also "RIGHT BUTTON". These game play directions are provided as an aid for the player when using the joystick control thumb buttons. The directions are linked to the following player options.

For right thumb button use:

1. Player action options: "TAKE WEAPON" (See Figure 6 on page 1-8).
2. Player action options: "TAKE HEALTH OBJECT" (See Figure 7 on page 1-8).
3. Player action options: "TAKE OBJECT WORTH GAME POINTS" (See Figure 8 on page 1-9).
4. Player action options: Involving and not involving objects collected. (See Figure 10 on page 1-10).

For left thumb button use:

1. Player action options: Involving and not involving objects collected. (See Figure 10 on page 1-11).

Whenever an Exterminator loses a hand-weapon during the game, a friendly droid (robot) will soon appear and provide a replacement weapon. The replacement may be the same as the weapon lost or it may be a different type. If, before the droid (robot) tosses out a replacement weapon, the Exterminator leaves the room (or outside area) through a doorway, the droid (robot) and replacement weapon will be gone when the Exterminator returns.

FIGURE 1. XENOS: DESCRIPTIONS & METHODS OF ATTACK

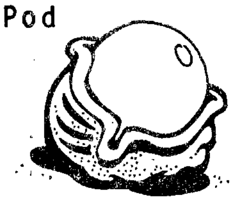
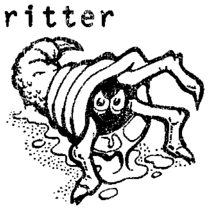
NAME	DESCRIPTION	METHOD OF ATTACK
Pod 	A green spore which will hatch into a Critter after a period of time	None
Critter 	A cross between a small, three-legged squid and a scorpion	It physically "latches" onto the Exterminator with its legs.
Rollerbaby 	A thick-skinned cross between a large turtle and an armadillo	After curling into a ball, it knocks the Exterminator down by rolling into him (or her).
Tentacle 	Not an individual creature, but rather one of many long-reaching appendages of a huge creature hiding behind the walls	It "latches" onto the Exterminator by wrapping around the Exterminator's head.
Snotterpillar 	A very large, leaping, heavily armoured cross between a lizard and a caterpillar that spits slimey venom at its victims	1. It knocks the Exterminator down by leaping against him (or her). 2. It strikes (and sometimes knocks down) the Exterminator with its spit.
Festor 	A very large, menacing, reptile-like creature that waits (behind walls, near doors, windows and other openings) to attack without warning	1. It "latches" onto the Exterminator with its telekinetic gaze. 2. It strikes (and sometimes knocks down) the Exterminator with a ball-like Egg (which will change into a Pod after a period of time.

FIGURE 2. DAMAGE TO PLAYER-CHARACTER (EXTERMINATOR) & PLAYER HEALTH POINTS LOST

DESCRIPTION OF ACTION THAT CAUSES DAMAGE TO PLAYER-CHARACTER (EXTERMINATOR)	PLAYER HEALTH POINTS LOST
Exterminator is hit by the Fist of another Exterminator	1 point
Phaser (gun) explodes when it lands too close to a doorway after being knocked away from the Exterminator.	1 point
(Laser) Pistol explodes when it lands too close to a doorway after being knocked away from the Exterminator.	2 points
(Lightning) Rifle explodes when it lands too close to a doorway after being knocked away from the the Exterminator.	3 points
The Exterminator is hit by a laser beam from the Laserball (servomech).	4 points
(Smoke) Gun explodes when it lands too close to a door-way after being knocked away from the Exterminator.	10 points
The Exterminator walks into an active Electrical Force Wall.	50 points
A Rollerbaby knocks down the Exterminator.	50 points
A Snotterpillar strikes the Exterminator with its spit.	Varies between 35 to 100 points*
The Exterminator is hit by dripping slime from the ceiling.	75 points
The Exterminator is hit by a Bomb thrown by another Exterminator.	100 points
The Exterminator is hit by an Egg thrown by a Festor.	Varies between 20 to 130 points*
The Exterminator is knocked down by a Snotterpillar.	150 points
A Critter "latches" onto the Exterminator causing a continuous health point drain.	2 points/decrement
A Tentacle "latches" onto the Exterminator causing a continuous health point drain.	4 points/decrement
A Festor "latches" onto the Exterminator causing a continuous health point drain.	20 points/decrement

* The further the distance, the fewer health points will be lost.

FIGURE 3. DAMAGE TO XENOS & OTHER PESTS CAUSED BY PLAYER-CHARACTER (EXTERMINATOR)

PEST DAMAGE CAUSED BY THE EXTERMINATOR		BY LASER BEAM	BY FIST	BY WEAPON	BY BOMB	GAME POINTS AWARDED
Destroys a Pod ready to hatch		Yes 3	Yes	Yes	Yes	25 points
Destroys a Critter		Yes 3	Yes	Yes	Yes	50 points
Destroys a Rollerbaby	When curled up	No	No	No	Yes	75 points
	When uncurled	Yes 3	Yes	Yes	Yes	75 points
Destroys a Tentacle		Yes 3	Yes	Yes	Yes 1	100 points
Destroys a Snotterpillar		Yes 3	Yes	Yes	Yes	125 points
Destroys a Festor		Yes 3	Yes	Yes	Yes	250 points
Destroys an Egg thrown by a Festor		No	Yes	Yes	Yes	10 points
Destroys Spit from a Snotterpillar		No	Yes	Yes	Yes	100 points
Destroys Dripping Slime		No	Yes	Yes	No	100 points
Destroys a Laserball (servomech)		4	Yes	Yes	Yes 2	250 points
Briefly disables source of Dripping Slime in the ceiling of the room		No	Yes	Yes	No	500 points

1) If the Tentacle has broken through the floor of the room. But **not** if it has broken through the ceiling of the room.

2) Only if the Laserball (servomech) is closer to the floor of the room than it is to the ceiling.

3) When Exterminator inserts I.D. Card, the Laser Ball (as an ally of the Exterminator) will damage Xenos.

4) Laser Ball using Laser Beam will damage Xenos.

FIGURE 4. DESTINATION BASES: GAME RACK ORDER, LEVELS, & ROOMS PER LEVEL

DESTINATION BASE	GAME RACK NUMBER	NUMBER OF LEVELS	NUMBER OF ROOMS PER LEVEL
First Shuttle (Mother Ship)	1	1	8
Moon Base	2	2	8
Star Ship	3	3	8
Star Base	4	4	8
Moon City	5	3	8
Star Port	6	2	8
Moon Port (Asteroid)	7	3	8
Star City	8	5	8
Second Shuttle	9	1	8

NOTE: After the completion of RACK #9, the game play continuously recycles from RACK #2 through RACK #9 until the game ends for all of the Players.

FIGURE 5. GAME RACK OUTCOMES & BONUS POINT AWARDS

GAME RACK OUTCOME	GAME BONUS POINTS AWARDED	HEALTH BONUS POINTS AWARDED
The base self-destructs because it's overrun by Xenos.	No bonus points	No bonus points
The Player orders the destruction of the base by using the Fast-Destruct Code.	100 points for each Xeno destroyed	No bonus points
The base is cleared of Xenos.	300 points for each Xeno destroyed	200 health points

FIGURE 6. RIGHT THUMB-BUTTON PLAYER ACTION: <u>TAKE WEAPON</u> OPTIONS

PLAYER ACTION OPTION	RIGHT THUMB-BUTTON INSTRUCTION	GAME POINTS AWARDED
Pick Up The Phaser (Gun)	TAKE PHASER	10 points
Pick Up The (Laser) Pistol	TAKE PISTOL	200 points
Pick Up The (Lightning) Rifle	TAKE RIFLE	300 points
Pick Up The (Smoke) Gun	TAKE GUN	400 points

NOTE: These weapons are only those found on the floor or the ground by the Exterminator(s).

FIGURE 7. RIGHT THUMB-BUTTON PLAYER ACTION: <u>TAKE FOOD OBJECT</u> OPTIONS

PLAYER ACTION OPTION	RIGHT THUMB-BUTTON INSTRUCTION	HEALTH POINTS AWARDED	GAME POINTS AWARDED
Take Food	EAT FOOD	50 points	100 points
Take Drink	DRINK FLUID	50 points	100 points

NOTE: These objects are only those found on the floor or the ground by the Exterminator(s).

FIGURE 8. RIGHT THUMB-BUTTON PLAYER ACTION: TAKE OBJECT (WORTH GAME POINTS)

PLAYER ACTION OPTION/ RIGHT THUMB-BUTTON INSTRUCTION	PURPOSE OF PLAYER ACTION	GAME POINTS AWARDED
TAKE CAN	No purpose	100 points*
TAKE CASH	No purpose	500 points
TAKE DEVICE	No purpose	250 points
TAKE JETPAC	No purpose	250 points
TAKE KEY	The Key is used to turn off an Electrical Force Wall.	1000 points
TAKE BONES	No purpose	250 points
TAKE KNIFE	The Knife is used to cut free from the grip of the Tentacle.	500 points
TAKE BOMB	The Bomb is thrown at a Xeno or another Exterminator.	500 points
TAKE BOMBS	The Bombs are thrown at a Xeno or another Exterminator.	1000 points
TAKE FUEL	No purpose	250 points
TAKE LAMP	No purpose	250 points
TAKE SEEDS	No purpose	250 points
TAKE MATCH	No purpose	250 points
TAKE DISC	The Disc is used to beam (transfer) the Exterminator to another area in the base.	1000 points
TAKE TOOLS	The Tools are used to repair the Gizmo (a Bomb-throwing machine).	500 points
TAKE PAIL	No purpose	500 points
TAKE ROPE	No purpose	500 points
TAKE VIAL	No purpose	250 points
TAKE I.D. CARD	When the I.D. Card is "shown" to a Laserball (servomech), it will become an ally instead of being an enemy.	500 points

* The "TAKE CAN" Player action option also earns 50 health points.

FIGURE 9. RIGHT THUMB-BUTTON PLAYER ACTION OPTIONS: INVOLVING OR NOT INVOLVING OBJECTS COLLECTED

PLAYER ACTION OPTION	RIGHT THUMB-BUTTON INSTRUCTION	PURPOSE OF PLAYER ACTION	GAME POINTS AWARDED
Break Glass	BREAK GLASS	To get at Fast-Destruct Code Box	1000 points
Elevator Down	DOWN	See option	No points
Fast Destruct	USE CODE	Player Fast-Destructs the base	500 points
Insert (Smoke) Gun	INSERT GUN	To deposit & regain the Weapon for game points	500 points
Insert Phaser (Gun)	INSERT PHASER	To deposit & regain the Weapon for game points	500 points
Insert (Laser) Pistol	INSERT PISTOL	To deposit & regain the Weapon for game points	500 points
Insert (Lightning) Rifle	INSERT RIFLE	To deposit & regain the Weapon for game points	500 points
Read Code	READ CODE	Fast-Destruct Code must be read before the code can be used	1000 points
Remove Key	REMOVE KEY	To turn on Electrical Force Wall	250 points
Throw Bomb	THROW BOMB	Throw bomb at a Xeno or another Exterminator	500 points
Throw Critter	THROW CRITTER	To stop the continuous health point drain	100 points
Use Gizmo	TAKE BOMBS	To use the Bombs (taken from the Gizmo machine) as weapons	1000 points

FIGURE 10. LEFT THUMB-BUTTON PLAYER ACTION OPTIONS: INVOLVING OR NOT INVOLVING OBJECTS COLLECTED

PLAYER ACTION OPTION	LEFT THUMB-BUTTON INSTRUCTION	PURPOSE OF PLAYER ACTION	GAME POINTS AWARDED
Call Elevator	PUSH BUTTON	See option	10 points
Cut Tentacle	USE KNIFE	See option	250 points
Duck	CROUCH	Defensive action	No points
Fix Gizmo	REPAIR GIZMO	It allows the player to take Bombs from the Gizmo (Bomb Throwing Machine).	1000 points
Get up	STAND UP	Defensive action	No points
Inner Space Beam	INSERT DISC	To beam (transfer) to another area in base	No points
Insert Key	INSERT KEY	Into flashing square, to turn off Electrical Force Wall	No points
Jump	JUMP	Defensive action	No points
Jump Up	JUMP UP	Defensive action	No points
Off Destruct	OFF DESTRUCT	Player temporarily stops base Self-Destruct timer	10 points
Pull Free Of Festor	BREAK FREE	See option	No points
Pull Free Of Festor	BREAK FREE	See Option	No points
Show I.D. Card	SHOW I.D.	By showing I.D. Card to Laserball (servomech), it will become an ally instead of an enemy	1000 points
Show Time	PUSH BUTTON	Converts screen display in room of base from "PERCENT OF XENOS KILLED" to "SELF-DESTRUCT TIME"	
Elevator Up	UP	See option	No points
Use The Bubble Screen	PUSH BUTTON	To activate Bubble Screen while another Exterminator stands behind it.	10 points

GAME OPERATION

Your XENOPHOBE video game is a one player, two player, or three player model with a color television monitor. From the player's perspective, the game has has three possible modes of operation: ATTRACT, READY-TO-PLAY, AND PLAY. From the Service Technician's perspective, the game has two additional modes: POWER-UP TEST (which takes place immediately after power to the game is turned on) and SELF-TEST. Descriptions of these two test modes are on pages 1-21 & 1-22.

Note that this game has **no** HIGH SCORE/INITIAL mode.

Unique game features are:

1. Displayed on the monitor screen, a three-way split screen effect which gives each player a separate viewing area.
2. A coin door with three (3) separate coin slots; one for each player.
3. A separate joystick control (with its own Start trigger) for each player.

The left coin slot and left joystick control correspond to the top viewing area displayed on the monitor screen. The center coin slot and center joystick control correspond to the center viewing area displayed on the monitor screen. The right coin slot and right joystick control correspond to the bottom viewing area displayed on the monitor screen.

Although two or three players must always share the same rack (or "base") during game play, the unique game features provide the players with a great deal of independence.

READY-TO-PLAY MODE

1. The Ready-To-Play mode begins, for each player, when proper coinage has been been accepted in that player's coin slot.
2. The Ready-To-Play mode ends, for each player, when the Start trigger is pressed on that player's joystick control.
3. If the Start trigger is not pressed, the Play mode will begin automatically after a short period of time.

PLAY MODE

1. The Play mode begins for each player when the Start trigger is pressed on that player's joystick control.
2. The Play mode ends for each player when his (or her) player-character has been eliminated. The message "GAME OVER INSERT COIN" is displayed on the monitor screen. the Attract Mode then continues.

TWO PLAYER OR THREE PLAYER OPERATION

In the Two Player mode or the Three Player mode, the game play is the same except for the following:

1. The first person to play will progress through the arrangement of racks by his (or her) own skill alone until one or two new players join in the game play. Each new player will automatically begin in the same rack as the first player. Now the competition for game points begins.

2. While they are in competition, two or three players may join forces, play independently, or make their player-characters attack each other (with "fists" or "bombs"). However, the players will always share the same rack (or "base") and their common goal is to rid each base of Xenos.

3. Game Play for you, the player, will continue until your player-character is eliminated. At this point, the game will go in one of two directions as shown in the following two situations.

YOUR PLAYER-CHARACTER ELIMINATED - OTHER PLAYER-CHARACTERS REMAINING

1. The message "GAME OVER INSERT COIN" is displayed on the monitor screen in your viewing area. The game has gone into the Attract mode.

2. The Play mode continues in the same rack for the other one or two players.

YOUR PLAYER-CHARACTER ELIMINATED - NO OTHER PLAYER-CHARACTERS REMAINING

1. The message "GAME OVER INSERT COIN" is displayed on the monitor screen in your viewing area and also in the other two viewing areas. All game play has completely ended. The game has gone into the Attract mode.

2. At this point, any player who enters the Play mode will begin at the first rack.

GENERAL INSTRUCTIONS

FOR

X E N O P H O B E - 3 P L A Y E R - U. R.

INSTALLATION & INSPECTION

1. After removing the game from its shipping carton, inspect the exterior of the cabinet for any signs of damage.

2. Remove keys from the taped coin return slot to unlock and open the cabinet's front door. Note that keys for the cabinet's rear doors are on a keyhook which is located on the inside (left) of the coin door.

3. After removing the parts bag from inside the coin box, remove four (4) leg levellers (and their respective hex nuts) from the parts bag. The special wrench for tork tamper-resistant screws should be left in the game cabinet.

4. Tip the cabinet to its side and remove shipping cleats from its bottom.

5. After locating four (4) threaded holes on the bottom of the cabinet (one in each corner), install one leg leveller (with it's hex nut) in each hole and level the cabinet.

6. Stand the cabinet upright and make certain that it is in a stable position.

7. Unlock and remove the upper rear door and the lower rear door, then inspect the interior of both cabinet areas for any signs of damage.

8. Referring to the game's wiring diagram, located in Section 3 of this manual; check to see that all cable connectors and cable plugs are correctly secured and firmly seated. **DO NOT FORCE PLUGS ONTO CONNECTORS.** Watch out for damaged plugs or connectors and avoid making reversed connections.

9. Check all major sub-assemblies to be sure that they are mounted securely.

10. **LINE VOLTAGE SELECTION:**

    Your game is designed to work properly on the line voltage where you are located. Check your line voltage with a meter to determine what its value is. The "LINE VOLTAGE SELECTION CHART" in your game's cabinet wiring diagram indicates how three (3) jumper wires **MUST** be fastened to connector "A" of your game's POWER CHASSIS (part #A945-00059-0200) so that your line voltage can be used SAFELY as power input to the game.

    If the existing jumper wire connections are not correct for your local line voltage, make the correct connections according to the game wiring diagram's "LINE VOLTAGE SELECTION CHART".

INSTALLATION & INSPECTION, Cont'd.

If the line voltage in your area falls outside the upper or lower limits of the range of voltage inputs covered in the "LINE VOLTAGE SELECTION CHART", **DO NOT PLUG YOUR GAME IN** until you have talked with your distributor and/or called the Bally Midway Service Department and obtained a solution to the problem, otherwise you could damage your game.

11. After lifting out the 3-pronged line cord (connected to the POWER CHASSIS), close up and lock the front and rear doors.

12. Connect the 3-pronged line cord to a 3-slot A.C. wall outlet to **insure proper grounding.**

13. The power ON/OFF switch is located on top of the cabinet on the left rear side when facing the front of the cabinet.

14. **LOCATION REQUIREMENTS:**

    A. Power: Domestic 117V @ 60 Hz.
    Foreign 230V @ 50 Hz.

    B. Temperature: 32° to 100°F (0° to 38°C)

    C. Humidity: Not to exceed 95% relative.

    D. Game height: 75" (187 cm.)

    E. Space required:

        1. Wide cabinet version (for games with serial numbers 101 through 200): 29-1/2" W. X 38" D. (75 cm. X 96-1/2 cm.)

        2. Narrow cabinet version (for games with serial numbers 201 and higher): 27-1/2" W. X 38" D. (70 cm. X 96-1/2 cm.)

A. TO SERVICE THE CONTROL PANEL

1. **Turn power to the game off.**

2. The control panel is held in place by two latch clamps which provide constant pressure on the strikes. One latch clamp is on the left side, and the other latch clamp is on the right side of the cabinet. They can be reached through the coin door.

3. To release the clamps, lift up and toward the center of the control panel.

4. Once they are released, unhook them from their strikes.

5. Swing out the control panel on its hinge so that the chain attached to the right (blue) player's control bracket supports the control panel.

6. To resecure the control panel, reverse steps 2 through 5 and then turn power to the game on.

NOTE: To remove the control panel for **bench-servicing only:**

1. With the control panel in its open position, disconnect it from its cabling.

2. Disconnect the ground (yellow) strap from the left (red) player's control bracket.

3. While cradling the control panel, disconnect its support chain from the cabinet and remove the screws which secure the continuous hinge to the cabinet.

4. The control panel is now loose and may be removed.

5. To reinstall the control panel, reverse steps 2 through 4 and then turn power to the game on.

B. REMOVAL OF THE VIEWING GLASS

1. **Turn power to the game off.**

2. The top of the viewing glass is held in place by a slot in the cabinet. The bottom of the viewing glass is held in place by resting on the wooden support shelf. The bottom of the viewing glass is also held in place by a retaining bracket.

CAUTION:

As you work through the following steps, **firmly support the viewing glass with one hand** so that it does not fall off the viewing glass support shelf and break.

3. The retaining bracket is secured to the cabinet with five (5) tork tamper-resistant screws. Remove these screws by using a special wrench you have left inside the cabinet.

B. REMOVAL OF THE VIEWING GLASS, Cont'd.

4. By putting your fingers in the hole in the middle of the viewing glass support shelf, swing the bottom of the viewing glass slightly forward, **carefully** let it down.

5. To install the viewing glass, reverse steps 2 through 4 and then turn power to the game on.

C. REMOVAL OF THE MONITOR BEZEL

1. **Turn power to the game off.**

2. Remove the viewing glass.

3. Remove the monitor bezel securing screws and the monitor bezel may be removed.

4. To reinstall the viewing glass and the monitor bezel, reverse steps 2 & 3 and turn power to the game on.

D. MONITOR REPLACEMENT

CAUTION

We recommend that you read the "DISCONNECT POWER DURING REPAIRS" section on page ii before beginning this procedure.

DANGER

The monitor DOES NOT contain an isolation transformer in its chassis (it is mounted instead in the Power Chassis Assembly located on the floor of the cabinet). When servicing the monitor on on a test bench, YOU MUST ISOLATE THE MONITOR FROM A.C. VOLTAGE WITH AN ISOLATION TRANSFORMER.

1. **Turn power to the game off.**

2. Open the upper rear door. Remove the viewing glass and the monitor bezel.

3. Completely disconnect the monitor from all of its cabling including its chassis ground strap.

4. The monitor's mounting flanges are secured by four (4) bolts to two monitor mounting brackets mounted to the cabinet right and left sides. Remove these bolts and slide the monitor out through the front cabinet opening.

CAUTION

While removing the four bolts, **firmly support the monitor from the front of the CRT** so that it will not slip.

D. MONITOR REPLACEMENT, Cont'd.

5. To reinstall the monitor, reverse steps 2 through 4, and then turn power to the game on.

6. After replacing the monitor, run the game SELF-TEST.

E. REMOVAL OF THE HEADER ATTRACT GLASS

1. **Turn power to the game off.**

2. The glass is held in place by a retaining bracket at the bottom and top of the glass.

3. The top retaining bracket is secured to the cabinet by five tork tamper-resistant screws. Remove these screws by using a special wrench provided in the parts bag you removed earlier from the coin box.

4. Remove the top retaining bracket and slide the header up. This exposes the fluorescent light assembly.

5. The fluorescent light tube may be replaced at this time.

WARNING

If you drop a fluorescent tube and it breaks, **it will implode!** Use care in handling.

6. The fluorescent light tube starter may also be replaced at this time.

   a. **Be sure the power to the game has been turned off.**

   b. Grasp the starter (it is on the back of the mounting bracket of the fluorescent light assembly), give it a quarter turn, and remove it from its socket.

   c. To replace the fluorescent light tube starter, reverse this procedure.

7. To reinstall the header (attract) glass, reverse steps 2 through 4 and then turn power to the game on.

F. REMOVAL OF THE FLUORESCENT LIGHT ASSEMBLY

1. **Turn power to the game off.**

2. Remove the header (attract) glass.

3. Disconnect the fluorescent light assembly from its power cable.

4. Remove the screws which secure the assembly to the cabinet and lift out the assembly.

5. To reinstall the fluorescent light assembly, reverse steps 2 through 4 and then turn power to the game on.

G. REMOVAL OF THE SPEAKERS

1. **Turn power to the game off.**

2. Remove eight (8) tamper-resistant screws which secure the speaker grille to the cabinet and remove the speaker grille. Remove these screws by using a special wrench provided in the parts bag you removed earlier from the coin box.

3. Remove the lower rear door.

4. Disconnect both speakers from their cabling.

5. Each of the two speakers is secured to the cabinet with two (2) carriage bolts and two (2) hex nuts. Remove the speakers by removing the nuts and sliding the bolts out of the cabinet. Note that in the process, the ground wires to both speakers are also removed.

6. To reinstall the speakers, reverse steps 2 through 5 and turn power to the game on.

H. VOLUME CONTROL POTENTIOMETER & SELF-TEST SWITCH

1. The VOLUME CONTROL pot is located, along with the CREDIT SERVICE push button switch and the SELF-TEST slide switch, on the test bracket which is mounted just inside the cabinet near the left side of the coin door frame. (see Figure 11)

2. To make the sounds louder, turn the pot clockwise as you face it.

3. To make the sounds less loud, turn the pot counter-clockwise as you face it.

4. When changing any game options, always perform the Self-Test and play the game to be sure the options selected are working properly.

I. OPTION SWITCH SETTINGS

1. The option switch controls all game options. It is located on the 68000 VIDEO BOARD which is mounted inside the lower portion of the cabinet. Refer to "Option Switch Settings" (Figure 13) on page 1-23.

2. Refer to the "VIDEO BOARD Reference Drawing" (Figure 14) on page 1-23 for the option switch location.

3. Removing the 68000 VIDEO BOARD from where it is mounted in the cabinet, to change the option switch settings, is unnecessary. However, when the 68000 VIDEO BOARD is removed and then reinstalled, ensure that the board is reassembled properly.

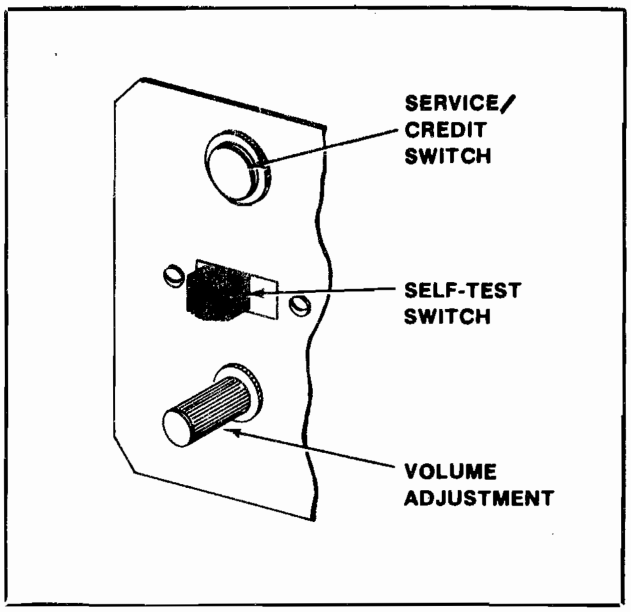


Figure 11. Service/Credit, Self–Test Switches & Volume Control Adjustments

J. FUSE LOCATION

The following fuse is used in the XENOPHOBE game:

PART NUMBER	DESCRIPTION	CIRCUIT/LOCATION
0017-00003-0263	Fuse MDA, 3AG, 4 AMP Slo-Blo 115 VAC	Input Power/Power Chassis Assembly (Part #A945-00059-0200)

POWER-UP TEST MODE

This test sequence is designed to effectively locate and identify any malfunction on the SOUNDS GOOD P.C. Board. Test results are indicated by an L.E.D. located on the sound board.

On power-up, under normal operation, the sound board runs through its self-diagnostic checks, flashing its L.E.D. to indicate each successful test. At the end of the diagnostic test, the attract mode begins and the game is ready to accept coins.

If one of the tests fails however, the L.E.D. will not flash for the failed test nor for any remaining tests in the sequencial run. At this point, "SOUND BOARD INTERFACE ERROR" appears on the screen.

The following is the Self-Test routine for the SOUNDS GOOD P.C. Board

1st FLASH - Determines if the ROM (U7) is good.
2nd FLASH - Determines if the ROM (U8) is good.
3rd FLASH - Determines if the ROM (U17) is good.
4th FLASH - Determines if the ROM (U18) is good.
5th FLASH - The RAMs (U6, U16) is good.
6th FLASH - Determines if the PIA (6821) (U9).

IMPORTANT NOTE: There is **NO** battery back up provided for this game. All logic & memory functions will be retained through dip switch settings.

SELF-TEST MODE

The Self-Test mode is a special mode for checking the game switches and computer functions. It is the most complete way of checking the proper game operation and is quite easy to use.

The Self-Test mode may be entered at any time and from any mode of operation. Simply locate the black slide switch on the test bracket inside the coin door and slide it to the Self-Test position. The game will enter the Self-Test mode immediately and display the following test menu....

1. BOOKKEEPING
2. SWITCHES & SOUNDS
3. OPTION SWITCHES
4. CONVERGENCE GRID
5. SELF-TEST

PRESS THE CREDIT/SERVICE PUSHBUTTON SWITCH TO CONTINUE

1. BOOKKEEPING TEST: This test is designed to display the TOTAL number of COINS inserted to date and also the average length of GAME TIME PER COIN to date (in seconds). To exit this test, press the credit/switch pushbutton switch.

2. **SWITCH AND SOUNDS TEST:** The SWITCH portion of this test is designed to confirm the operation of player input switches and device switches in the game. When you enter the test, the screen displays the following:

FIGURE 12. SWITCH TEST

LEFT PLAYER	CENTER PLAYER	RIGHT PLAYER
JOYSTICK UP OFF DOWN OFF LEFT OFF RIGHT OFF	JOYSTICK UP OFF DOWN OFF LEFT OFF RIGHT OFF	JOYSTICK UP OFF DOWN OFF LEFT OFF RIGHT OFF
(THUMB) BUTTONS LEFT OFF RIGHT OFF	(THUMB) BUTTONS LEFT OFF RIGHT OFF	(THUMB) BUTTONS LEFT OFF RIGHT OFF
TRIGGER OFF	TRIGGER OFF	TRIGGER OFF
COIN OFF	COIN OFF	COIN OFF
	TILT OFF	

"OFF" means that the switch is open. When you activate any one of the above switches, its respective message "OFF" changes to "ON" to indicate that the switch is closed.

The SOUNDS portion of this test will cause a unique sound to be emitted for every switch that is manually activated in the game except for:

1. Coin Switches
2. TILT (Slam) Switch
3. Option DIP-Switches (Dual-In-Line Package)

To exit this test, press the credit/service pushbutton switch.

3. **OPTIONS SETTINGS TEST:** All game options are adjusted through the use of DIP-switches located on the 68000 VIDEO BOARD. When this test is selected, a full display of the current DIP-switch settings will appear on the screen (see Figure 13 on page 1-23). To exit this test, press the credit/service pushbutton switch.

4. **CONVERGENCE GRID DISPLAY:** This test is designed to display a crosshatch pattern used in adjusting the color monitor. This pattern may be used to adjust convergence, color balance, vertical linearity, and vertical/horizontal size. To exit this test, press the credit/service pushbutton switches.

5. **SELF (DIAGNOSTIC) TEST:** This test is designed to effectively locate and identify any malfunction of the on-board computer. When selected, the game enters this mode immediately and begins scanning the memory stored in ROM (Read Only Memory) and RAM (Random Access Memory). If the test is successful, at the end of the scan "ALL TEST OK" is displayed on the scree. If a defective component is found during the scan, that component and its location will be displayed on the screen. The entire test is performed in approximately 15 seconds. To exit this test, press the credit/service pushbutton switch.

FIGURE 13. XENOPHOBE 3 PLAYER UPRIGHT

OPTION SWITCH SETTINGS

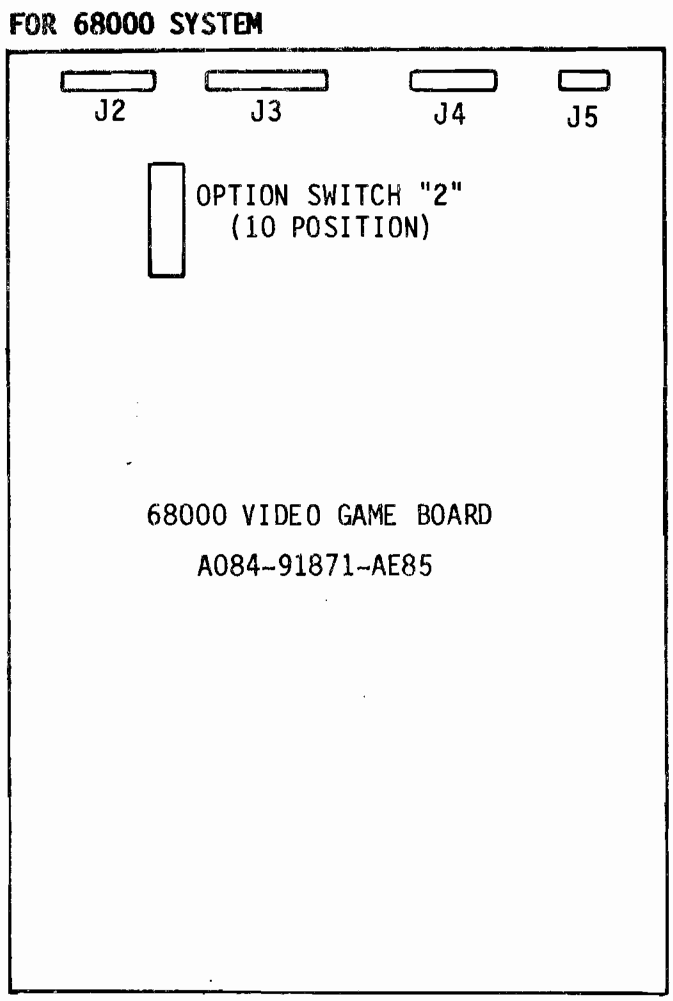
PART NO. M051-00E85-B007

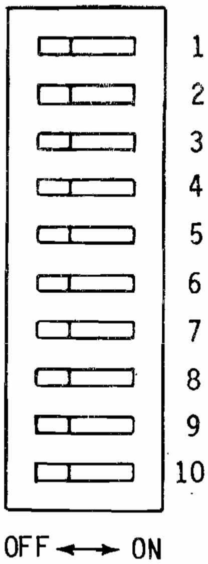
SLIDE SWITCHES:	SW#1	SW#2	SW#3	SW#4	SW#5	SW#6	SW#7	SW#8	SW#9	SW#10
	NOT USED	NOT USED							NOT USED	
GAME PLAY MODE:										
NO FREE PLAY			OFF							
FREE PLAY			ON							
COINS PER LIFE UNIT:										
1 COIN				OFF						
2 COINS				ON						
LIFE UNIT:										
1000 POINTS					OFF					
2000 POINTS					ON					
ATTRACT SEQUENCE SOUNDS:										
SOUNDS						OFF				
NO SOUNDS						ON				
DIFFICULTY LEVEL:										
HARD							ON	OFF		
MEDIUM							OFF	OFF		
EASY							OFF	ON		
MEDIUM							ON	ON		
VIDEO FREEZE MODE:										
NORMAL VIDEO										OFF
FREEZE VIDEO										ON

NOTES:

1. FACTORY SETTING: ALL SLIDE SWITCHES SET IN THE "OFF" POSITION.
2. THE DUAL-IN-LINE PACKAGE (DIP) OF SWITCHES "SW2" IS LOCATED ON THE 68000 VIDEO BOARD AT POSITION "A13".

FIGURE 14. VIDEO BOARD REFERENCE DRAWING





TROUBLESHOOTING PROCEDURE

INTRODUCTION

This manual offers generalized troubleshooting procedures for common types of malfunctions which can be applied to most video games. We will not attempt to give you specific instructions for troubleshooting particular games because this would involve hundreds of pages of more repetitive instructions, differing only in the specific details of each game.

The most common problems occur in components such as the coin acceptor, player controls, interconnecting wiring, etc. These areas are covered in moderate detail.

The TV Monitor and Game Logic Printed Circuit Boards (PCB's) provide their fair share of problems too, but not to the extent of the harness and its component parts.

As you already know, the Game Logic PC Boards are complex devices. Each contains a great number of different interrelated circuits. The major changes which give each game its own particular individuality are accomplished in the EPROMS (Erasable Programmable Read Only Memories) and other Integrated Circuit devices that are installed on each of these PC Boards.

GENERAL TROUBLESHOOTING SUGGESTIONS

The first step in troubleshooting is to correctly identify the malfunctions symptoms. This includes not only the circuits or features malfunctioning, but also those still operational. A carefully trained eye will pick up other clues to what's wrong as well. For instance, a game in which the computer functions fail completely just after money was collected may have a quarter shorting the PCB traces. Often an experienced troubleshooter will be able to spot the cause of a problem even before opening the cabinet.

After all the clues are carefully considered, the possible malfunctioning areas can be narrowed down to one or two good suspects. Those areas can be examined by a process of elimination until the cause of the malfunction is discovered.

HARNESS COMPONENT TROUBLESHOOTING

Typical problems falling in this category are coin and credit problems, power problems, and failure of individual features.

NO GAME CREDIT - - For example, a prospective game player inserts a coin or token and is not awarded a game. The first thing to check is whether or not the coin or token is returned. If it was returned, the malfunction most certainly lies in the coin acceptor itself. First, use a set of test coins (both old and new) to ascertain that the player's coin is not undersize or underweight. If your test coins are also returned, coin acceptor servicing is indicated. Generally, the cause of this particular problem is a maladjusted magnet gate. Normally, this will mean slightly closing the magnet gate by turning the adjusting screw out a bit.

When the coin or token is not returned and there is no game credit, the cause of the malfunction may be in one of several areas. First, try operating the coin return button; if the coin is returned, the problem is most likely in the magnet gate. Enlarge the gap according the coin acceptor manufacturers service procedures. If this does not cure the problem, remove the coin acceptor, clean it, and perform the manufacturers suggested major adjustment procedure.

When the trapped coin is not returned when the wiper lever is actuated, you may have an acceptor jammed by a slug, gummed up with a liquid, a jammed coin chute, or mechanical failure of the acceptor mechanism. In this case, first check for the slug that will generally be trapped against the magnet. If a slug is found, simply remove it and test the acceptor. If the chute is blocked, remove the acceptor and remove the jammed coins. If there is actual failure of the acceptor, remove the unit and repair as indicated by the acceptor manufacturers service procedures.

When the coin is making its way through the acceptor (that is, falling into the coin box), yet there is still no game credit, you either have a mechanical failure of the coin switch or electrical failure of the coin and credit circuits. The first place to begin is by checking the coin switch. Most of these switches are the make/break variety of micro switch. They are checked for continuity between the "NO" (Normally Open), "NC" (Normally Closed), and "C" (Common) terminals. When **not** actuated, the "NC" and "C" terminals should be continuous and the "NO" terminal open. When actuated, the "NO" and "C" terminals should be continuous and the "NC" terminal open. If the coin switch checks good, inspect the solder connections to the coin switch terminals to be sure there is good contact at this point. If necessary, use a continuity tester and check from the terminal lug on the switch to the associated PCB trace. This will tell you if there is a continuity to the credit circuit.

Should the coin switch wires do check good, the problem is in one of the game logic boards -- most likely in the coin and credit circuitry.

When you do get a game credit when a coin is deposited, but the game will not start when the one or two player start button is pressed, there may be a problem in the start switch, the interconnecting wiring, or the game logic boards. First, check the switch. If the switch is OK, proceed to check the wiring. Again, make sure you go from the terminal lug on the switch to the PCB trace. This way, you will check the terminal contact as well as the PCB edge connector contact. If the wiring is continuous, proceed to check the PCB credit circuit. If not, check each section of the wiring, until the discontinuity is located. If the wiring is OK, the problem must lie in the games logic boards.

TRANSFORMER AND LINE VOLTAGE PROBLEMS

Your game **MUST** have the correct line voltage to operate properly. If the line voltage drops too low, one of the games logic circuits will disable the credit acceptance circuit. The point at which the games logic circuits will fail to function is approximately 100 VAC if your wall voltage is 120 VAC (or 190 VAC if your wall voltage is 230 VAC).

Low line voltage may have many causes. Line voltage normally fluctuates a certain amount during the day as the total usage varies. Peak usage times occur mainly at dawn and/or dusk. So if your games problem seems to be related to the time of day, this may be a factor. A large load connected to the same line as the game (such as a large air conditioner or other device with an exceptionally large electric motor) may drop the line voltage significantly when starting up. This drop can result in an intermittent credit problem. In addition, poor connections in the location wiring, plug, or line cord may also cause a significant drop in power. Cold solder joints in the games harness, especially in areas like the transformer connections, interlock switch, or fuse block, may also produce the same results, although probably on a more permanent basis.

Sometimes location owners (especially in bars) replace light switches with dimmer (switches) rheostats, and the game is sometimes on the same line. Obviously, the voltage available to the game is going to drop dramatically when the dimmer is turned down.

In any case, the way to check for proper line voltage is with your meter. Set the meter to a scale higher than the wall voltage and stick the probes into the wall outlet the game was connected to. If it's OK here, check the transformer primary connections. If you do not get 117 VAC, examine the solder joints on the transformer, fuse block, and interlock switch. If you do get 117 VAC, the problem must be either in the transformer, harness connections, or in the PCB power supply.

When you suspect the transformer, check its secondaries with the meter set to the 50 VAC scale and correlate the readings with the legend on the side of the transformer. The transformer must also be correctly grounded, therefore, check the ground potential as well, especially if there is a hum bar rolling up or down the Monitor screen.

NO POWER, NO PICTURE - - If the Monitor screen is completely dark, first check in back of the Monitor to see if the CRT filament is glowing. If it is, try adjusting the brightness control. If this has no effect, listen near the monitor for the high-pitched B+ hum produced by the flyback transformer. When you get the hum but there is still no picture, and you have tried adjusting the brightness, major Monitor servicing is indicated.

When the monitor seems completely dead, check the rest of the game to see if it has power. If it doesn't, go directly to the wall outlet and check there. If OK there, check the game fuse(s), interlock switch, and interconnecting wire lengths.

Sometimes it is difficult to tell if a slow-blow fuse has blown. If in doubt, check it using a meter set to any resistance range.

HARNESS PROBLEMS - - Other harness problems include short to metal components and malfunctioning controls. The repeating blown-fuse problem can sometimes be quite exasperating to solve. Short circuits have the tendency to occur in areas almost impossible to find. First, try inserting a new fuse. Old fuses age and sometimes blow without cause. If the new fuse also blows, you definitely have a short.

The best way to approach this problem is by disconnecting devices that may be causing the problem, such as the TV Monitor, the various PCB's one at a time, and the isolation transformer. Disconnect the devices by **FIRST** turning the game off, disconnecting it from its wall outlet. Remove the blown fuse and connect your meter across the terminals of the fuse block (this will save blowing a fuse each time you want to check the circuit). Set your meter to one of its resistance ranges. You should be reading a short. If not, you probably have a part that only shorts out after it has heated up, (we'll cover this in a minute). Therefore, assuming you are reading a short on your meter, disconnect the components from their cabling one at a time, checking the meter after each one is disconnected. When the short disappears, you have just disconnected the bad component. If all components are disconnected and the short still remains, the problem is in the harness and only patient exploration will reveal its location. Carefully examine all the wiring, looking for terminals that may be touching, metal objects such as coins shorting the connections, or burned insulation. If necessary, use the meter to check each suspected wire.

NOTE: Cable dressing is very important. The cable should be dressed away from the sharp metal corners or components in the game.

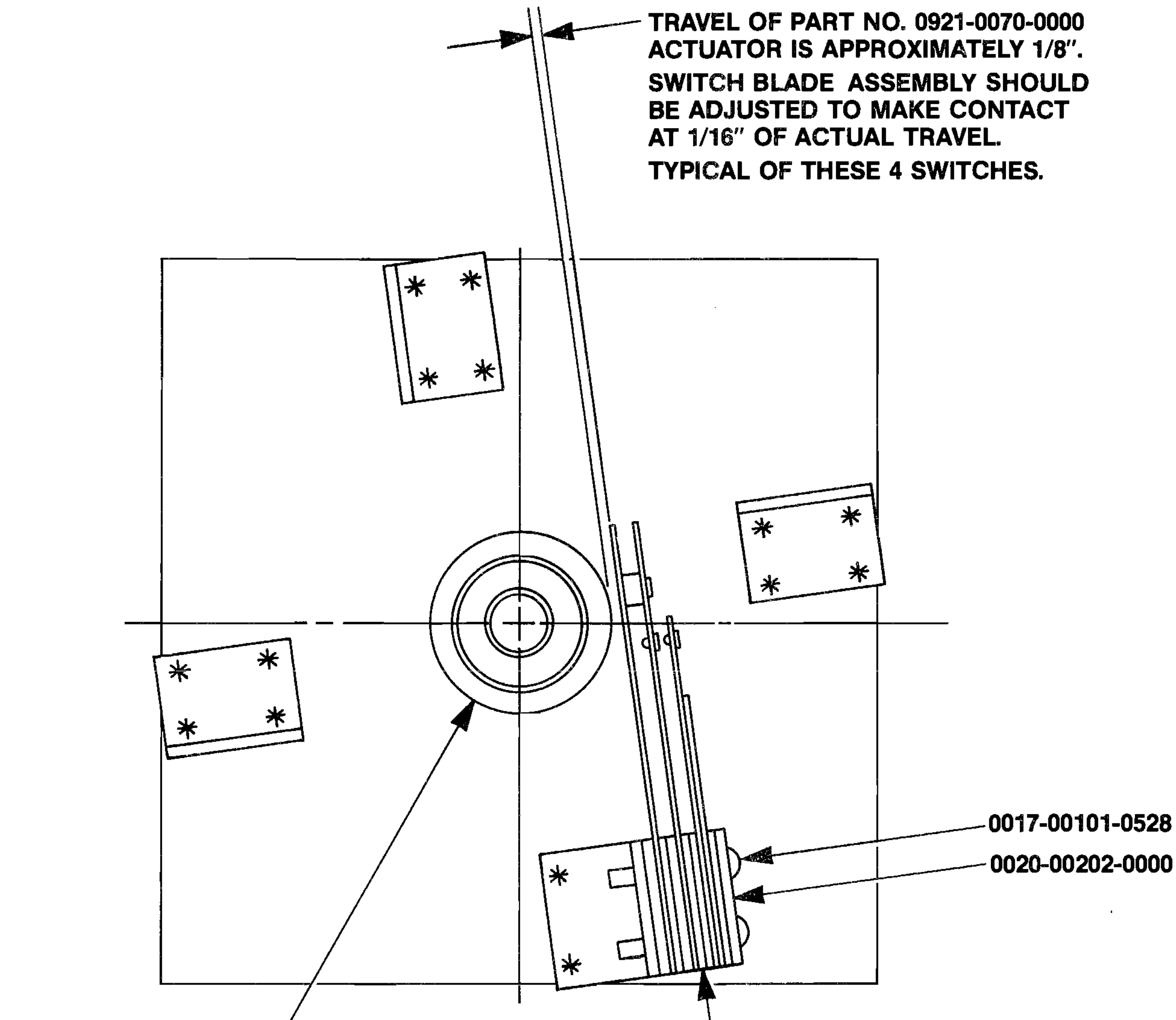
It is assumed that you connected your meter across the fuse block terminals as stated above and you did not read a short. This most likely means that you have a component somewhere in that game that **ONLY** goes bad **AFTER** it heats up. It checks good when its cold. In this case, turn the game off and disconnect **ALL** of its components. Install a known good fuse in the fuse block. And turn the game on. If the fuse does not blow after a few minutes, the cable is not the problem (In this instance it shouldn't be, actually, but it never hurts to check.) Next, turn the game off again and reconnect **ONE** component. Turn the game back on and wait a few minutes to see if the fuse blows. If it does not, turn the game off again and reconnect another single component.

Turn the game back on and wait a few minutes to see if the fuse blows. Repeat this procedure until the fuse blows. When it does blow, the last component you connected has the part on it that is going bad after it warms up and is shorting out.

MALFUNCTIONING CONTROLS - - The most common problem here is the bad potentiometer (pot). Typically, a bad pot will cause the image on the screen to jump when it reaches a certain point. The only cure for this one is to install a new pot.

When a feature that is operated by a switch (for example, joysticks and control panel buttons) does not operate at all, check the switch with a VOM or continuity tester to verify its operation. If the switch does not check good, replace it. If the switch is OK, you should suspect the input to the switch from the PCB. In this case, get out the harness and logic schematics and check to see what kind of input is supposed to be at this switch. In many cases, the input will be +5 VDC. If so, use the meter to check its presence with the game turned on. Normally, the switch is used to pull a +5 volt DC line LOW (near GROUND) or to pull a LOW line HIGH. If the PCB output is missing, check the wire length from the PCB. If you find the signal at the PCB trace, the wire length or connection is at fault. If there is no signal at the PCB trace, begin exploring the PCB using the logic schematics and game manual.

FIGURE 15. CONTROL ASSEMBLY SWITCH ADJUSTMENT SPECIFICATION



SECTION 2

ILLUSTRATED PARTS BREAKDOWN

NOTICE !!!

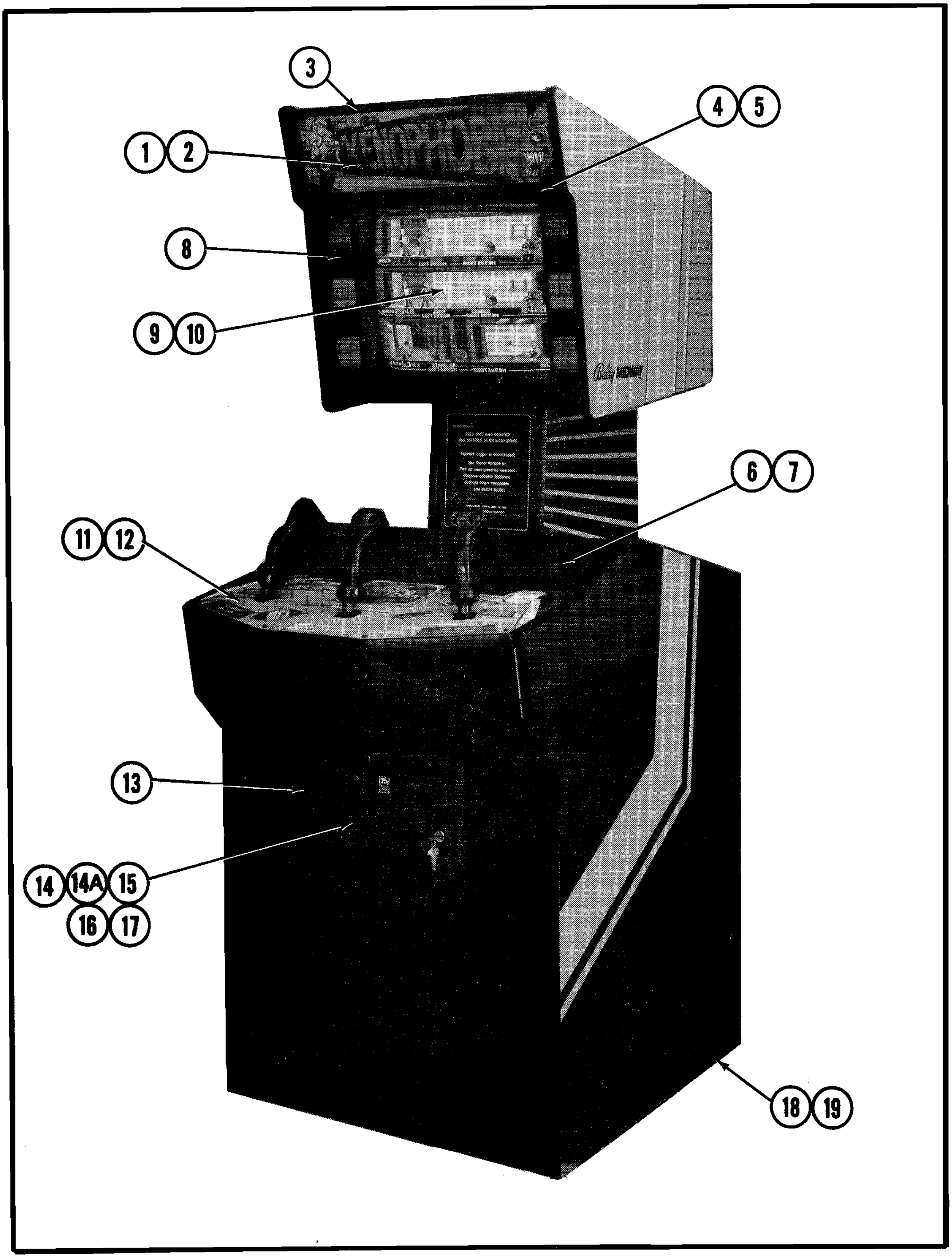
Two physically different versions of the XENOPHOBE Video Game Cabinet (Wide Cabinet & Narrow Cabinet) have been manufactured. The differences affect only the lower portion of the Game Cabinet.

The following cabinet and sub-assemblies are affected:

1. Lower Cabinet Assembly
2. Control Panel Assembly
3. Control Panel Overlay
4. Control Apron Weld Assembly
5. Control Plate Weld Assembly

There are no other differences between the two versions. Complete parts information affecting the lower XENOPHOBE Wide Cabinet and the lower XENOPHOBE Narrow Cabinet are included in this parts section.

FIGURE 16. XENOPHOBE U.R. - 3 PLAYER
FRONT CABINET VIEW

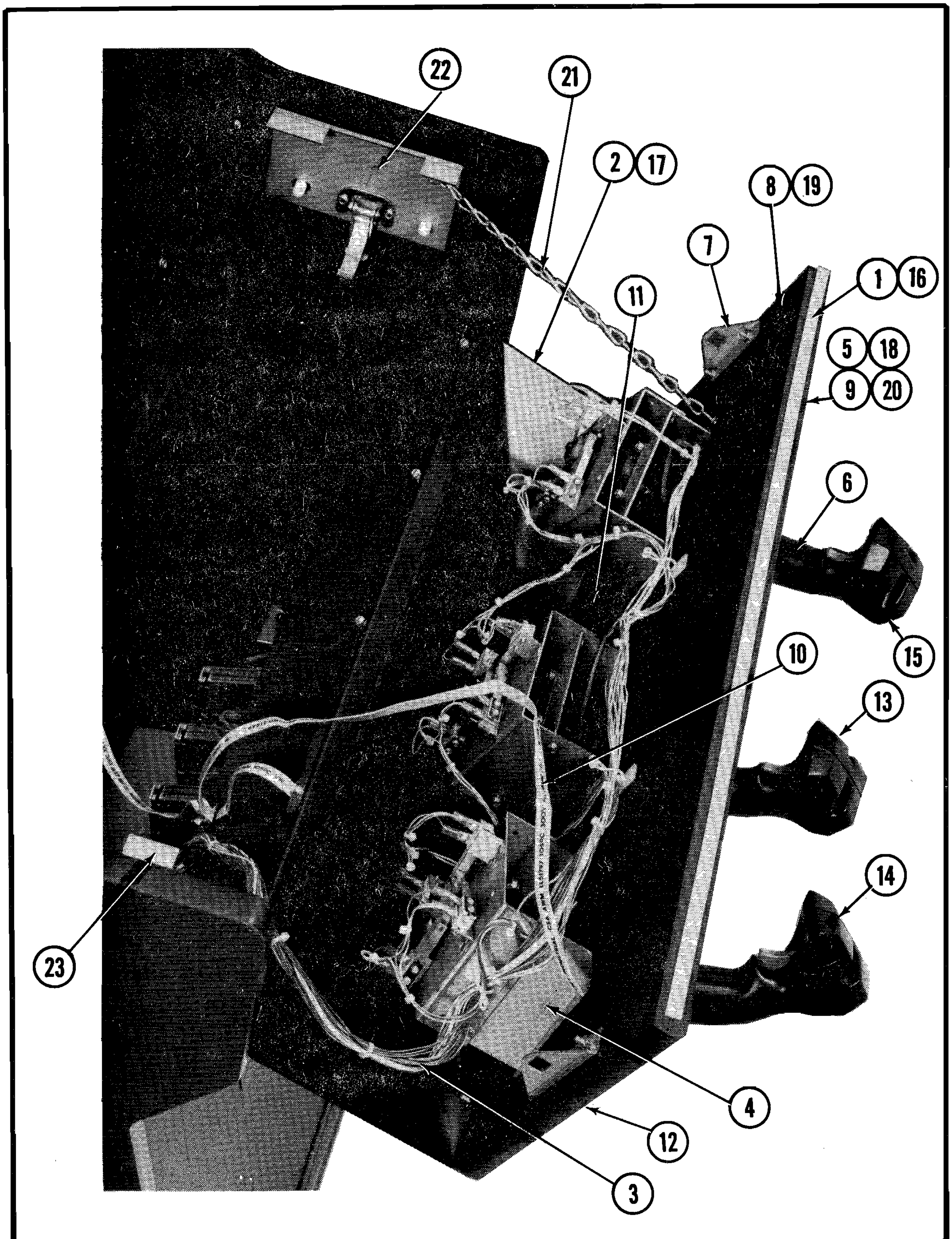


XENOPHOBE U.R. 3-PLAYER: WIDE - FRONT CABINET - PARTS LIST
PART NO. AE85-00001-0000
XENOPHOBE U.R. 3-PLAYER: NARROW - FRONT CABINET - PARTS LIST
PART NO. AE85-00001-0100

ORDER BY PART NUMBER **ONLY**

ITEM	PART NO.	DESCRIPTION
1	0E85-00900-00XF	SCREENED HEADER GLASS
2	A595-00011-0000	HEADER LIGHT ASSEMBLY
3	0574-00900-0800	RETAINER HEADER
4	0017-00101-0138	#8 x 5/8" TORX TAMPER PROOF SCREW (35 REQ'D.)
5	0017-00009-0522	LONG ARM KEY T-20 (LOCATED IN SPARE PARTS BAG)
6	0E85-00100-00XF	SPEAKER GRILLE
7	0017-00003-0570	SPEAKER: 5 1/4", 4 OHM, 15 WATT (2 REQ'D.) (NOT SHOWN)
8	0017-00042-0314	BEZEL: 19"
9	0E85-00901-00XF	VIEWING GLASS
10	0017-00003-0465	MONITOR: 19" COLOR DUAL SYNCH, HORIZONTAL MOUNTING
11	AE85-00004-0000	CONTROL SHELF ASSEMBLY **(FOR USE WITH WIDE CABINET ONLY)**
12	AE85-00004-0100	CONTROL SHELF ASSEMBLY **(FOR USE WITH NARROW CABINET ONLY)**
13	0090-00002-04BK	LARGE BLACK DOOR FRAME: DOUBLE
14	A982-00014-0021	COIN DOOR W/CABLE: BLACK 3 CHUTE
14A	A515-00021-0000	MULTIFUNCTION SWITCH BRACKET (INCLUDES NEXT 4 ITEMS) (NOT SHOWN)
	A515-00020-0000 0017-00032-0007 0017-00032-0051 105E-00001-0017	SWITCHING W/BRACKET ASSEMBLY - TEST SWITCH - SPDT SLIDE 4 AMP SWITCH - BUTTON RED POTENTIOMETER, 0-1K, 1/2 WATT
15	0017-00009-0477	MOLDED CASH BOX (NOT SHOWN)
16	0950-00115-0000	COVER: 3-SLOT COIN BOX (NOT SHOWN)
17	0950-00901-0000	BASKET: COIN BOX, WIRE (NOT SHOWN)
18	0017-00102-0048	LEG LEVELERS (4 REQ'D.)
19	0017-00103-0026	NUT: 3/8" x 16 HEX (4 REQ'D.) (FOR USE WITH LEG LEVELERS)

FIGURE 17. FRONT CABINET CLOSE-UP VIEW:
CONTROL PANEL IN SERVICE POSITION
PART NO. AE85-00004-0000

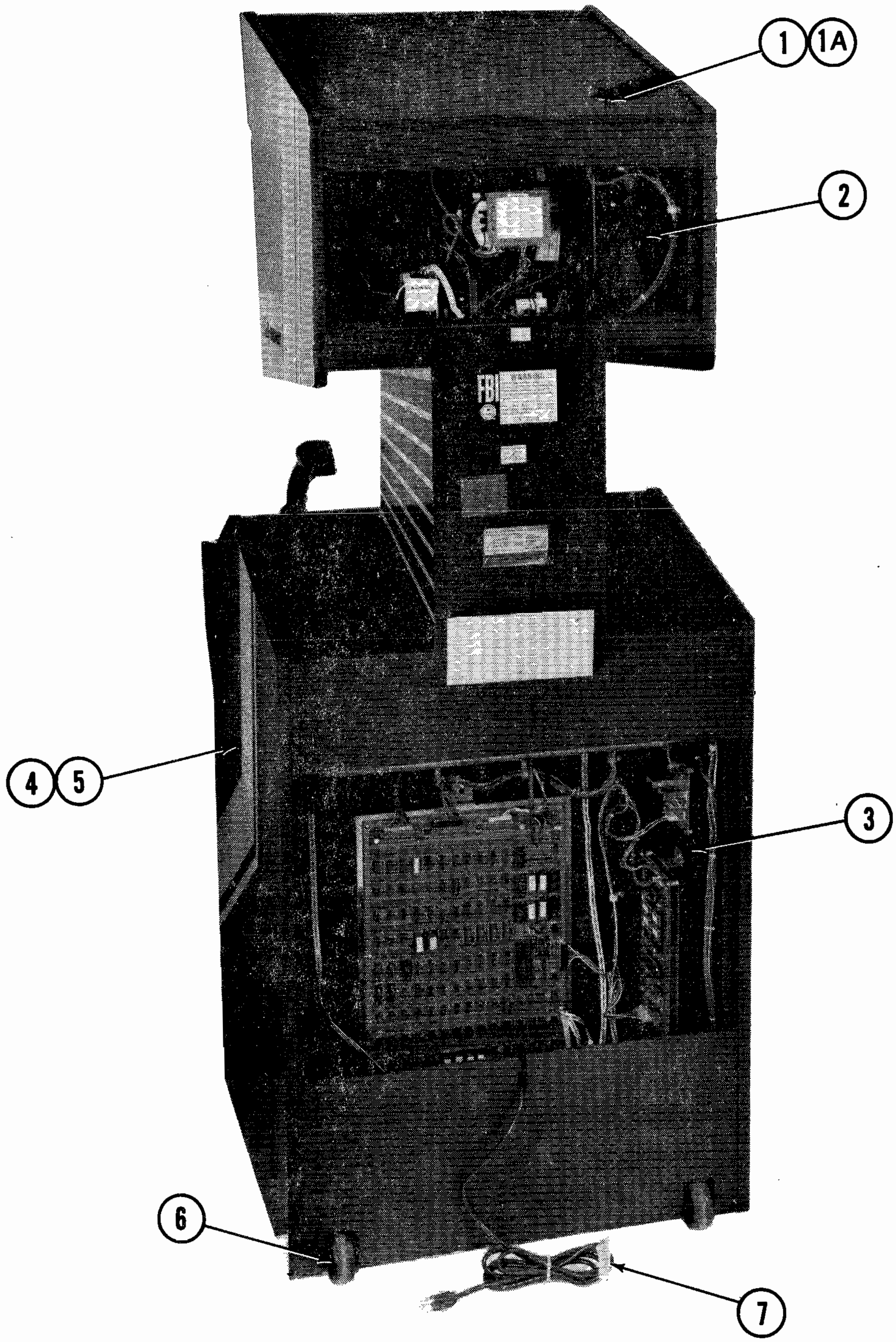


FRONT CABINET CLOSE-UP VIEW: CONTROL PANEL IN SERVICE POSITION

ORDER BY PART NUMBER **ONLY**

ITEM	PART NO.	DESCRIPTION
1	AE85-00004-0000	CONTROL SHELF ASSEMBLY **(ITEMS 2 THRU 14 ARE FOR USE WITH THE WIDE LOWER CABINET ONLY.)**
2	AE36-00010-00XF	CONTROL APRON WELD ASSEMBLY **(FOR USE WITH THE WIDE LOWER CABINET ONLY)**
3	AE85-00005-0000	CONTROL SHELF CABLE ASSEMBLY
4	AE85-00011-0000	CONTROL ASSEMBLY (3 REQ'D.) (SEE PAGE 2-13)
5	AE85-00021-00XF	CONTROL PLATE WELD ASSEMBLY **(USE WITH THE WIDE LOWER CABINET ONLY)** (NOT SHOWN)
6	AE85-00029-0000	CONTROL GRIP CABLE ASSEMBLY
7	0E36-00106-0000	STRIKE: CONTROL SHELF (2 REQ'D.)
8	0E85-00501-0000	CONTROL SHELF **(FOR USE WITH THE WIDE LOWER CABINET ONLY)**
9	0E85-00902-00XF	OVERLAY:CONTROL SHELF **(FOR USE WITH THE WIDE LOWER CABINET ONLY)**
10	0017-00009-0711	GROUND STRAP: 23 1/2"
11	0017-00103-0061	NUT: #8 - 32 HEX W/SEMS (4 REQ'D.)(NOT SHOWN)
12	0017-00103-0081	NUT: #10 - 32 HEX W/SEMS (12 REQ'D.) (NOT SHOWN)
13	AE85-00020-0200	YELLOW CONTROL GRIP ASSEMBLY (SEE PAGE 2-15)
14	AE85-00020-0000	RED CONTROL GRIP ASSEMBLY (SEE PAGE 2-15)
15	AE85-00020-0100	BLUE CONTROL GRIP ASSEMBLY (SEE PAGE 2-15)
16	AE85-00004-0100	CONTROL SHELF ASSEMBLY **(ITEMS 16 THRU 19 ARE FOR USE WITH THE NARROW LOWER CABINET ONLY, ALL OTHER PARTS ARE USED WITH WIDE LOWER CABINET.)**
17	AE85-00025-00XF	CONTROL APRON WELD ASSEMBLY
18	AE85-00021-01XF	CONTROL PLATE WELD ASSEMBLY (NOT SHOWN)
19	0E85-00501-0100	CONTROL SHELF
20	0E85-00902-01XF	OVERLAY: CONTROL SHELF
21	0E89-00004-0100	CHAIN: 12"
22	0E85-00105-0100	BRACKET: SHELF SUPPORT - RIGHT
23	0E85-00105-0200	BRACKET: SHELF SUPPORT - LEFT

FIGURE 18. REAR CABINET VIEW

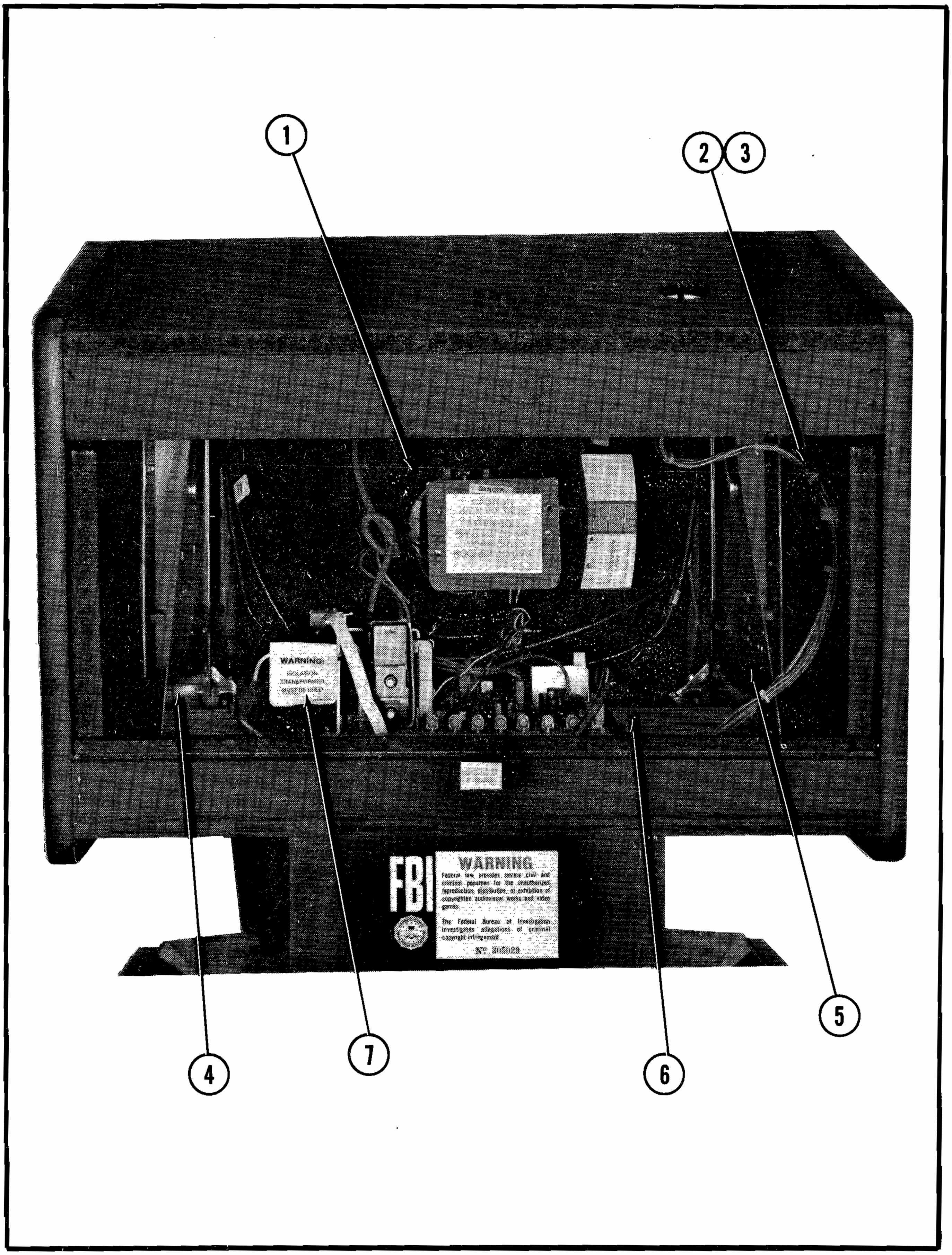


REAR CABINET VIEW - PARTS LIST

ORDER BY PART NUMBER **ONLY**

ITEM	PART NO.	DESCRIPTION
1	A945-00062-0000	ON/OFF SWITCH & PLATE ASSEMBLY
1A	0017-00032-0105	SWITCH: 2PST 6 AMP (USE WITH ITEM 1)
2	AE85-00014-0000	UPPER-REAR DOOR ASSEMBLY (INCLUDES THE NEXT 3 ITEMS) (NOT SHOWN)
	0017-00005-0226 0017-00103-0063 0639-00116-00XF	LOCK: KEYED ALIKE NUT: 3/4" x 24 FORT LOCK CAM: OFFSET 30 DEGREE
3	AE85-00015-0000	LOWER-REAR DOOR ASSEMBLY (INCLUDES SAME AS ITEM 2) (NOT SHOWN)
4	AE85-00500-0000	CABINET ASSEMBLY **(FOR USE WITH WIDE CABINET ONLY)**
5	AE85-00500-0100	CABINET ASSEMBLY **(FOR USE WITH NARROW CABINET ONLY)**
6	A961-00007-0000	CASTER WHEEL ASSEMBLY (2 REQ'D.)
7	A385-00023-0000 0017-00003-0500	LINE CORD ASSEMBLY - U.S.A.(INCLUDES THE FOLLOWING ITEM) LINE CORD - 3 CONDUCTOR

FIGURE 19. UPPER REAR CABINET CLOSE-UP VIEW

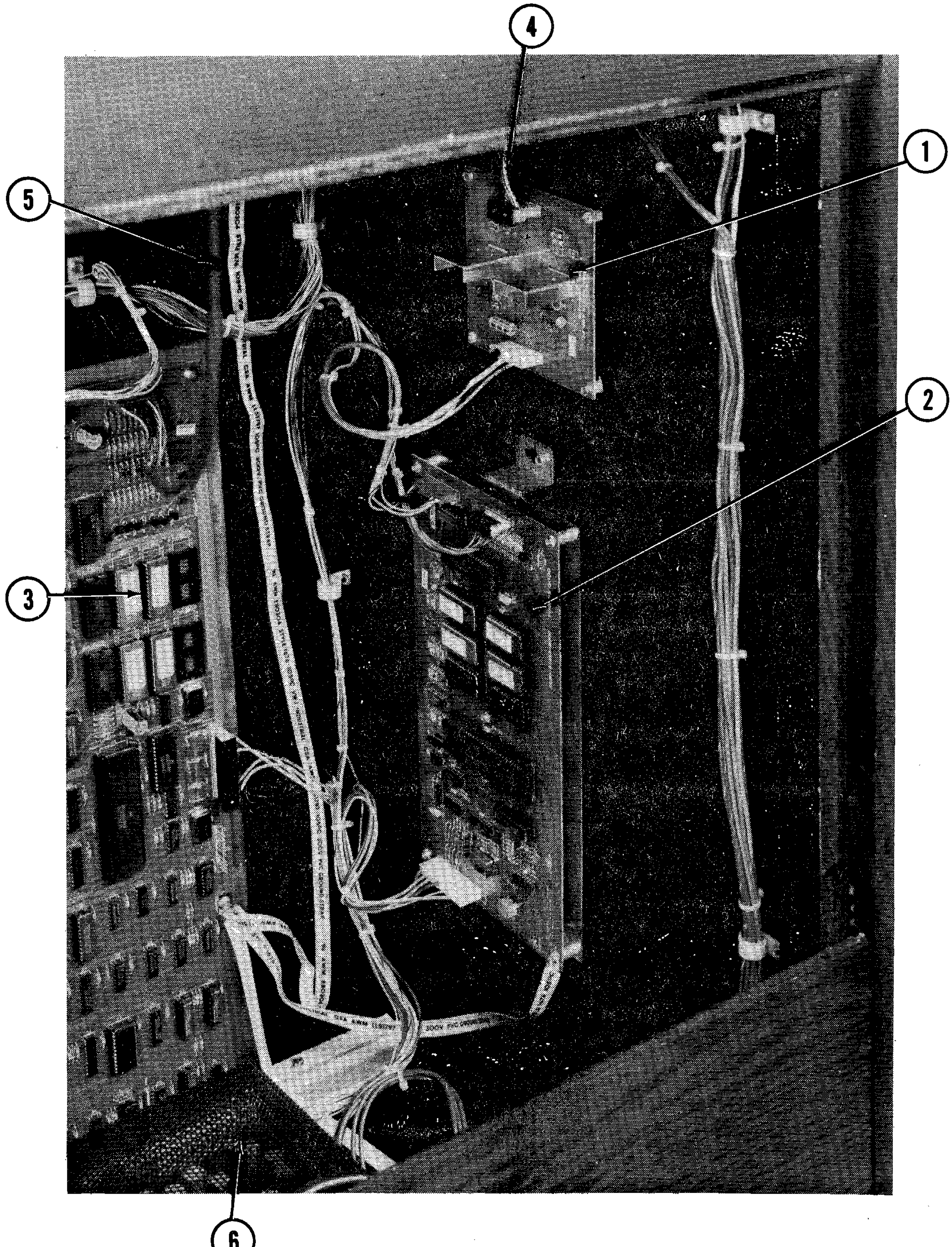


UPPER REAR CABINET CLOSE-UP VIEW - PARTS LIST

ORDER BY PART NUMBER **ONLY**

ITEM	PART NO.	DESCRIPTION
1	0017-00003-0465	MONITOR: 19" COLOR DUAL SYNCH HORIZONTAL MOUNTING
2	AE85-00006-0000	MASTER CABLE W/BRACKET ASSEMBLY (INCLUDES THE FOLLOWING 5 ITEMS)
	0017-00032-0007 0515-00107-0000 0017-00032-0051 105E-00001-0017 AE85-00024-0000	SWITCH: SPDT SLIDE 4 AMP BRACKET: SWITCH TEST/ VOLUME/ CREDIT BUTTON: SWITCH, RED POTENTIOMETER: 0 -1K 1/2W MASTER CABLE ASSEMBLY
3	AE85-00008-0000	HIGH VOLTAGE CABLE ASSEMBLY W/LINE CORD
4	0E36-00105-0100	BRACKET: RIGHT SHELF SUPPORT
5	0E36-00105-0200	BRACKET: LEFT SHELF SUPPORT
6	0E85-00103-0000	RAIL: MONITOR
7	MT00-00136-A000	ISOLATION TRANSFORMER W/O SHIELD 50/60HZ

FIGURE 20. LOWER-REAR CABINET CLOSE-UP VIEW

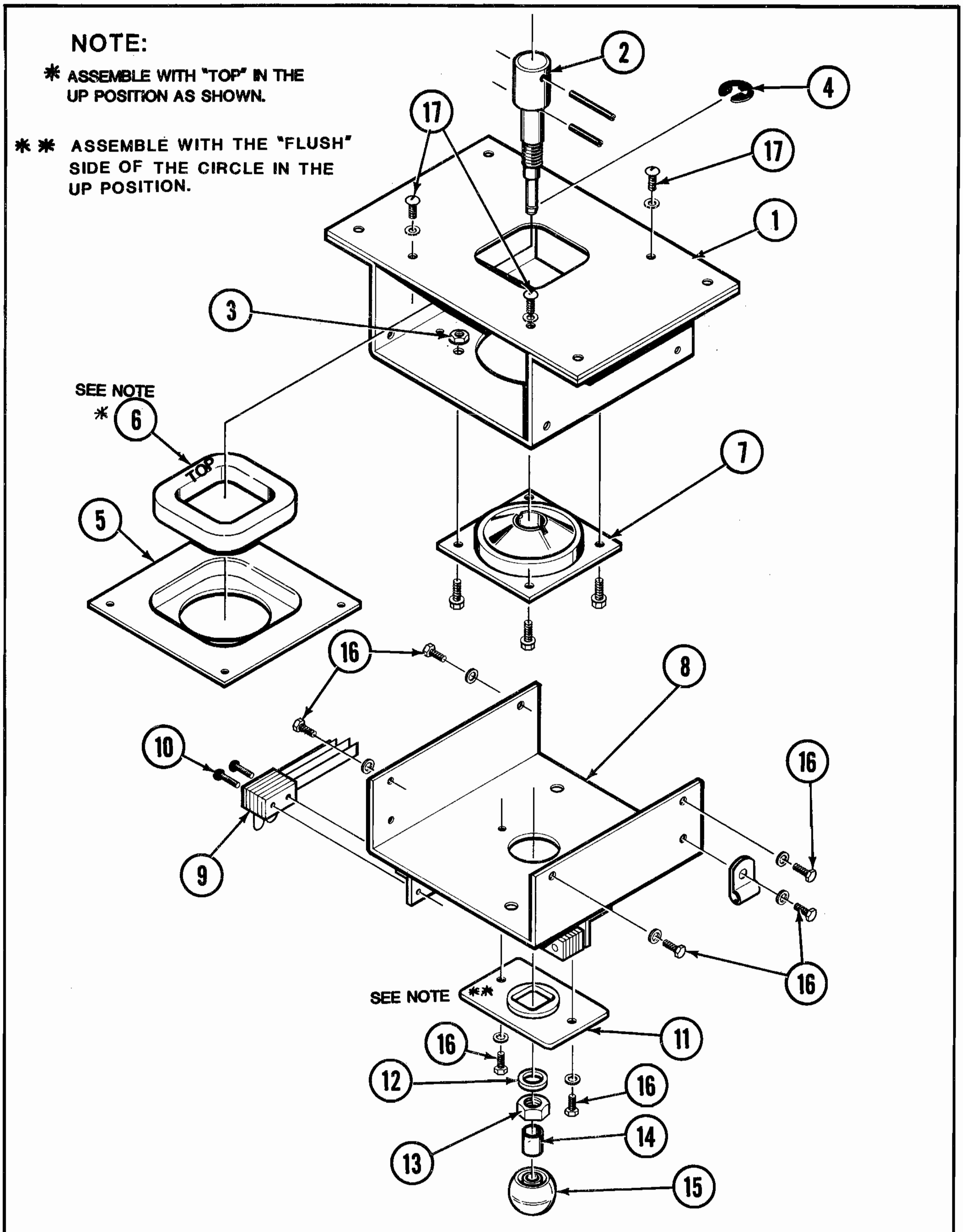


LOWER-REAR CABINET CLOSE-UP VIEW - PARTS LIST

ORDER BY PART NUMBER **ONLY**

ITEM	PART NO.	DESCRIPTION
1	AA11-00017-0000 0017-00042-0320	DUAL POWER AMP W/SPACERS (INCLUDES THE FOLLOWING ITEM) SPACER: #8 x 1/4" (4 REQ'D.)
2	A084-091863-AE85	PROGRAMMED SOUNDS GOOD P.C. BOARD ASSEMBLY
3	A084-91871-AE85	PROGRAMMED 68000 VIDEO P.C. BOARD ASSEMBLY
4	AE85-00017-0000	SPEAKER/AUDIO CABLE ASSEMBLY
5	AE85-00018-0000	MONITOR/VIDEO CABLE ASSEMBLY
6	A945-00059-0200	POWER CHASSIS ASSEMBLY: 130V SWITCHING W/O SWITCH

FIGURE 21. CONTROL ASSEMBLY
PART NO. AE85-00011-0000

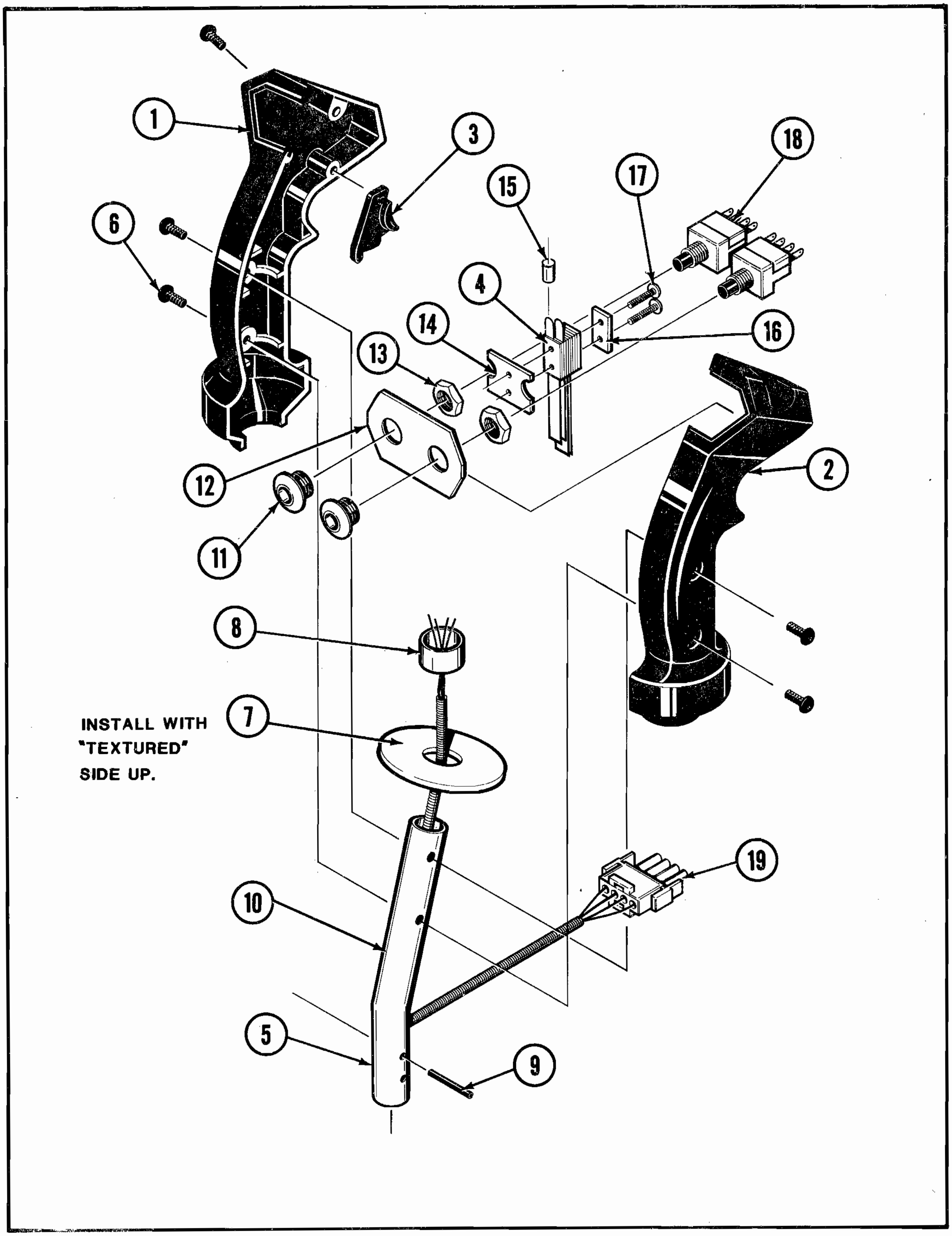


CONTROL ASSEMBLY - PARTS LIST
PART NO. AE85-00011-0000

ORDER BY PART NUMBER **ONLY**

ITEM	PART NO.	DESCRIPTION
1	A628-00026-00XF	CENTERING BRACKET WELD ASSEMBLY
2	0628-00700-00XF 0017-00007-0077 0017-00007-0079	ACTUATING PIN (INCLUDES THE FOLLOWING 2 ITEMS) ROLL PIN ROLL PIN
3	0017-00103-0081	#10-32 HEX NUT W/SEMS (4 REQ'D.)
4	0017-00100-0025	1/4" E-RING
5	0873-00113-00XF	BUMPER MOUNTING BRACKET
6	0873-00910-0000	BUMPER
7	0017-00041-0621	GROMMET - MODIFIED
8	AF01-00016-0000	STOP PLATE BRACKET W/SWITCH ASSEMBLY
9	A982-00009-0000	SWITCH ASSEMBLY: CONTROL
10	0017-00101-0528	#5-40 x 3/4" PHILLIPS ROUND HEAD MACHINE SCREW (8 REQ'D.)
11	0017-00104-0014	DISH WASHER (NOT SHOWN)
12	0017-00104-0034	WASHER
13	0017-00103-0102	NUT: 7/16 - 14 LOCKING
14	0696-00907-0000	SLEEVE
15	0921-00700-0000	ACTUATOR
16	0017-00101-0799	#10-32 x 3/8" SLOTTED HEX W/WASHER SCREW (11 REQ'D.)
17	0017-00101-0598	#8-32 x 5/16" SLOTTED HEX W/WASHER SCREW (6 REQ'D.)

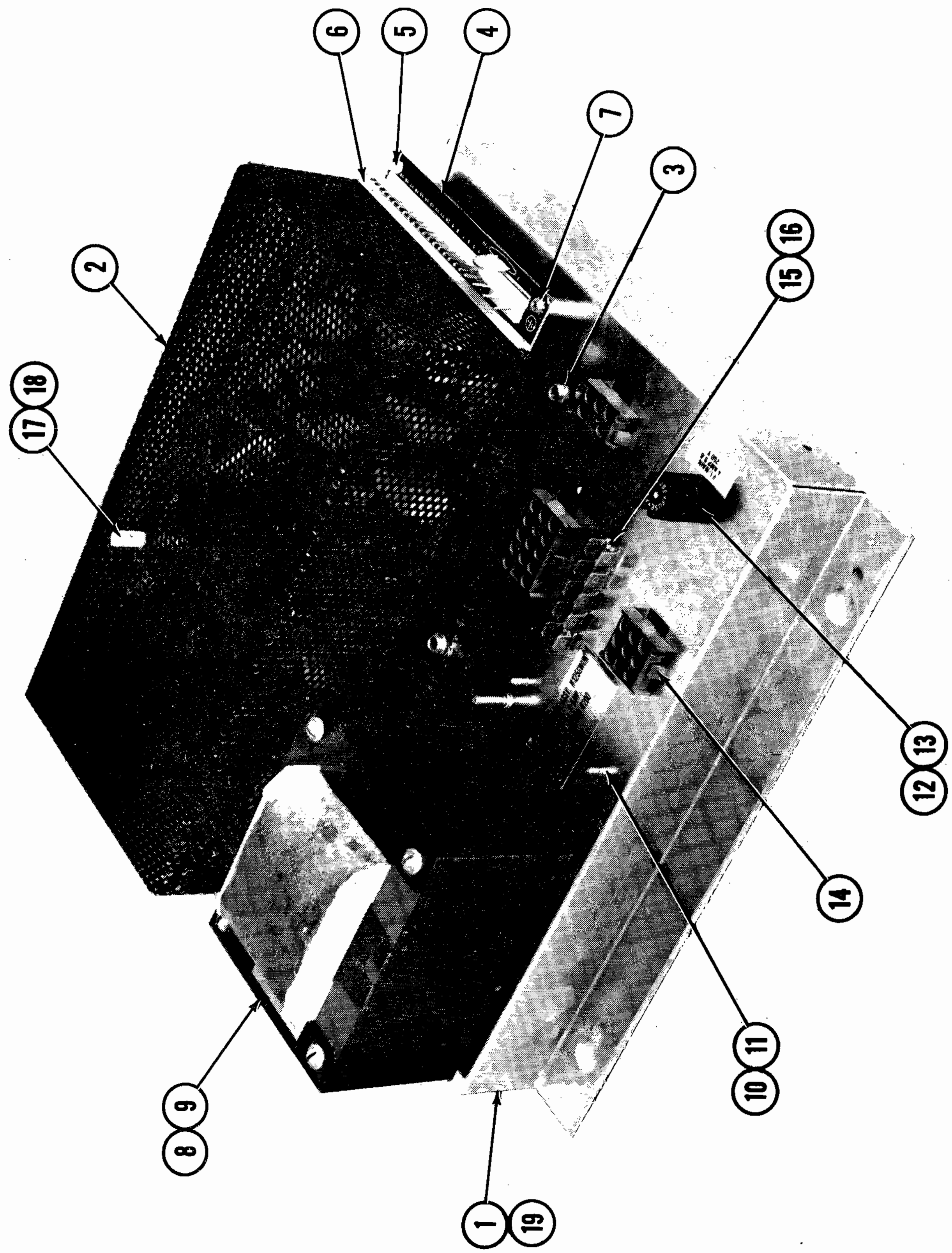
FIGURE 22. CONTROL GRIP ASSEMBLY
PART NO. AE85-00020-0000 – RED
PART NO. AE85-00020-0100 – BLUE
PART NO. AE85-00020-0200 – YELLOW



CONTROL GRIP ASSEMBLY - PART LIST
PART NO. AE85-00020-0000-RED
PART NO. AE85-00020-0100-BLUE
PART NO. AE85-00020-0200-YELLOW
ORDER BY PART NUMBER **ONLY**

ITEM	PART NO.	DESCRIPTION
1	0873-00900-0200	CONTROL GRIP - LEFT (3 REQ'D.)
2	0873-00900-0100	CONTROL GRIP - RIGHT (3 REQ'D.)
3	0628-00906-0000	TRIGGER (3 REQ'D.)
4	A628-00030-0000	CONTROL GRIP SWITCH ASSEMBLY (3 REQ'D.)
5	0628-00922-0000	WASHER (NOT SHOWN)
6	0017-00101-0149	#10-32 x 3/8" TORX TAMPER RESISTANT BUTTON HEAD SCREW (5 REQ'D.)
7	0628-00904-0000	SLIDE
8	0628-00701-00XF	SLEEVE
9	0017-00007-0077	ROLL PIN 1/8" X 12
10	A696-00019-0000	TUBING & PIVOT PIN ASSEMBLY
11	0929-00905-00XF	BEZEL: SWITCH-BUTTON
12	0E85-00903-0111	LENS: RED
12	0E85-00903-0112	LENS: BLUE
12	0E85-00903-0113	LENS: YELLOW
13	0017-00103-0089	NUT: 5/8"-24 HEX (2 REQ'D.)
14	0E85-00110-00XF	PLATE: SWITCH MOUNTING (3 REQ'D.)
15	0017-00041-0519	TUBING (2 REQ'D.)
16	0020-00202-0000	PLATE: SWITCH
17	0017-00101-0298	#5-40 x 5/8" PHILLIPS ROUND HEAD MACHINE SCREW (2 REQ'D.)
18	0017-00032-0092	SWITCH SPDT P.B. MOMENTARY LED (6 REQ'D.)
19	AE85-00029-0000	CONTROL GRIP CABLE ASSEMBLY

FIGURE 23. **POWER CHASSIS: 130VA SWITCHING**
PART NO. A945-00059-0200

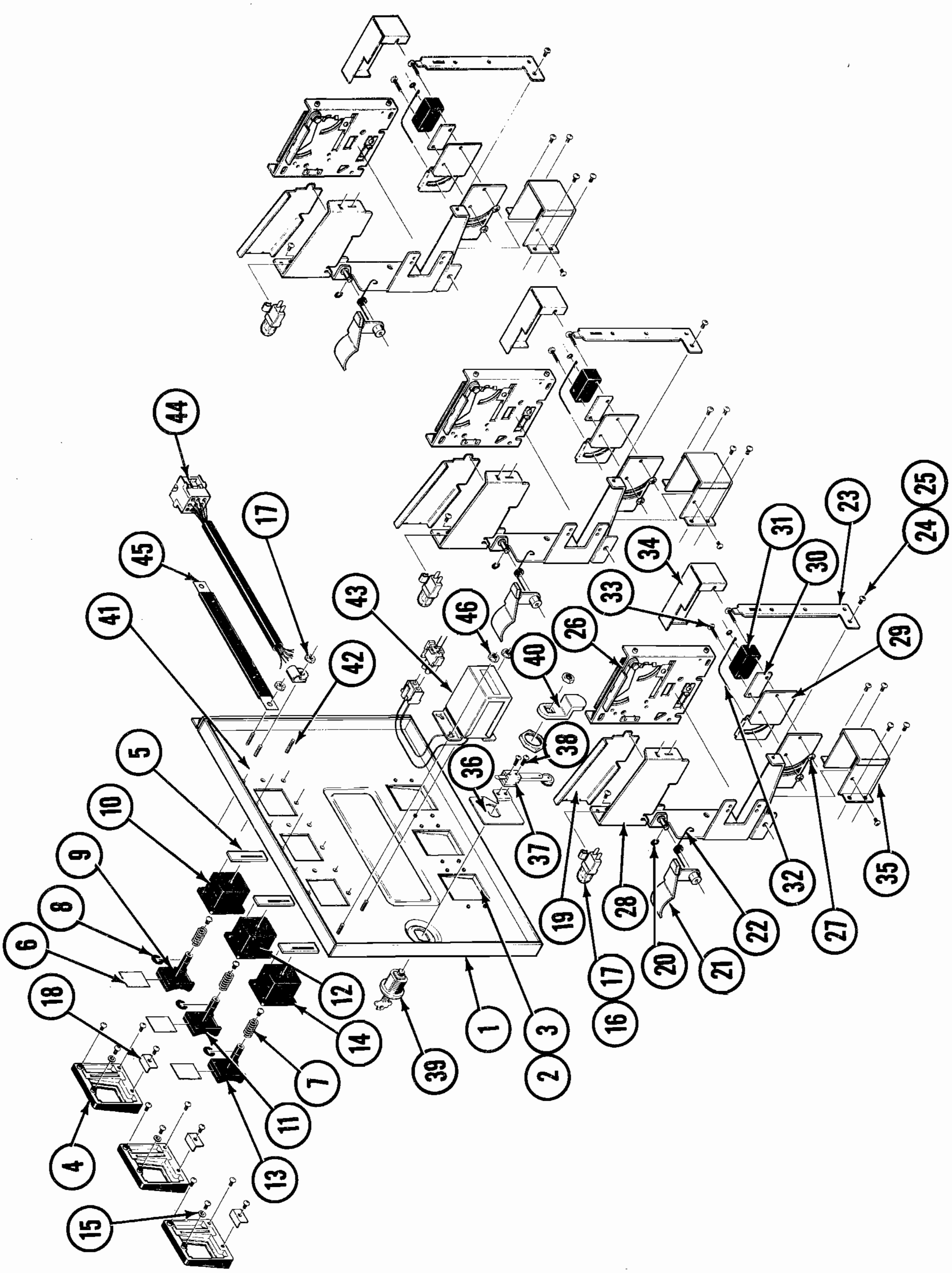


POWER CHASSIS: 130VA SWITCHING W/O SWITCH - PARTS LIST
PART NO. A945-00059-0200

ORDER BY PART NUMBER **ONLY**

ITEM	PART NO.	DESCRIPTION
1	A945-00057-01XF	CHASSIS SUB-ASSEMBLY
2	0945-00117-01XF	POWER SUPPLY P.C.B. COVER
3	0017-00101-0123	#8 x 1/4" UNSLOTTED HEX HEAD SCREW (8 REQ'D.)
4	0017-00003-0543	SWITCHING POWER SUPPLY - 125V
5	0017-00042-0663	SPACER: DUAL LOCK P.C. BOARD 3/8" (4 REQ'D.)
6	0540-00138-2100	CABLE PROTECTOR - 5"
7	0017-00101-0134	#6-32 X 1/4" PHILLIPS ROUND HEAD SCREW
8	MT00-00136-A000	ISOLATION TRANSFORMER ASSEMBLY W/O SHIELD -115V, 50/60 HZ
9	0017-00103-0061	#8-32 HEX NUT W/SEMS (4 REQ'D) (NOT SHOWN)
10	0017-00003-0114	LINE FILTER - 5 AMP, 115VAC (NOT SHOWN)
11	0017-00101-0067	#6 X 3/8" PHILLIPS PAN HEAD SCREW (2 REQ'D)
12	0017-00003-0433	FUSE HOLDER W/CAP
13	0017-00003-0263	FUSE MDA, 3AG, 4 AMP, 250 VAC SLO-BLO (NOT SHOWN)
14	A945-00030-0600	CONNECTOR & CABLE ASSEMBLY
15	0017-00021-0370	TERMINAL STRIP
16	0017-00101-0140	#4-40 X 5/8" PHILLIPS PAN HEAD SCREW (2 REQ'D)
17	0017-00009-0580	CAPACITOR ALIGNMENT TOOL
18	0017-00009-0581	ADJUSTABLE TOOL OIL HANDLE 2"
19	0945-00912-0000	HANDLE 1" (NOT SHOWN)
		ADDITIONAL PARTS LOCATED UNDER CHASSIS
	0017-00001-0004	VARISTOR-METAL OXIDE (275V)
	0017-00021-0110	2 POSITION TERMINAL BARRIER STRIP
	0017-00101-0780	#6 x 1/2" PHILLIPS PAN HEAD SCREW
	0017-00103-0084	#6-32 HEX NUT W/SEMS

FIGURE 24. FRONT DOOR W/CABLE: BLACK 3-CHUTE
PART NO. A982-00014-0021



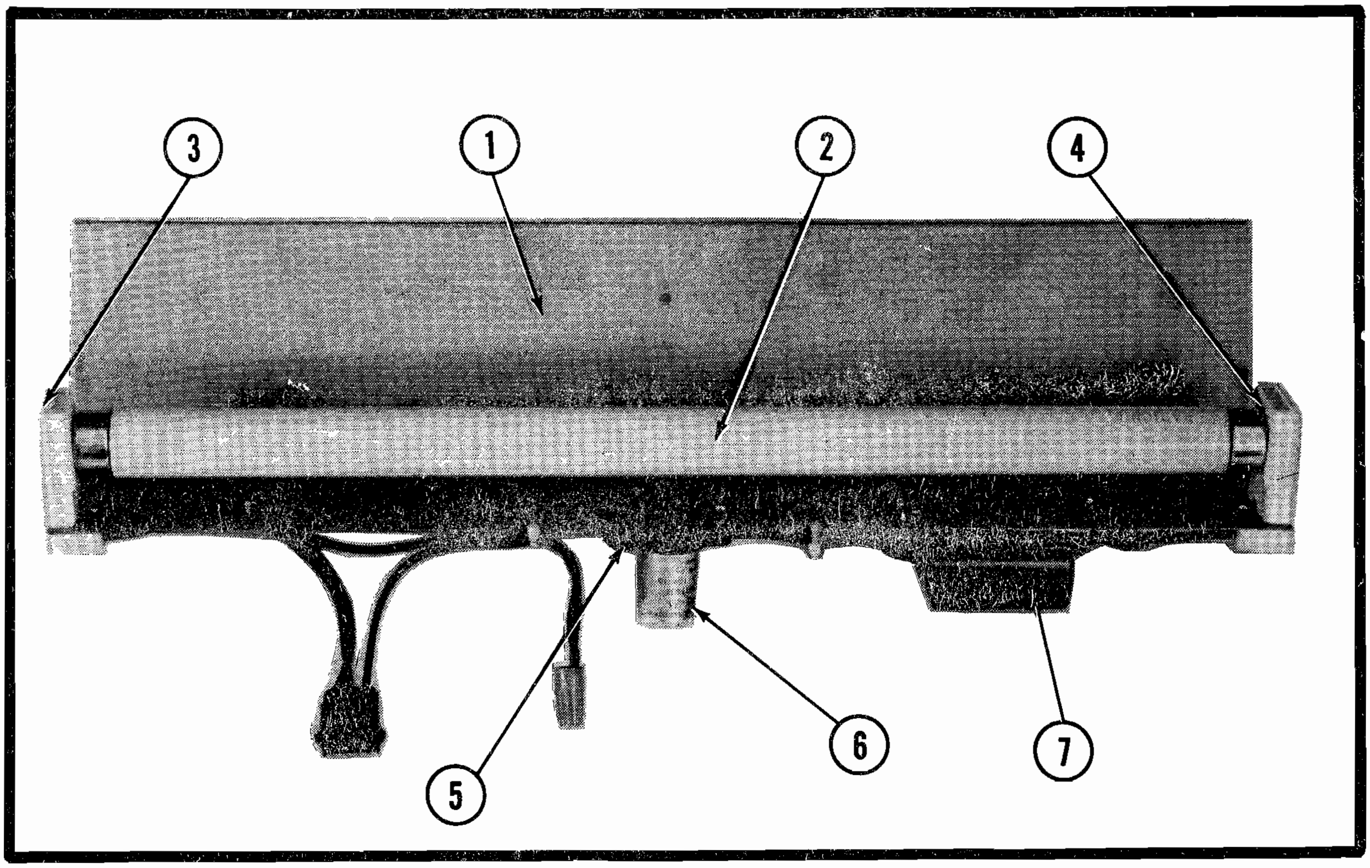
COIN DOOR W/CABLE: BLACK 3-CHUTE - PARTS LIST
PART NO. A982-00014-0021
ORDER FROM COIN MECHANISM BY PART NUMBER **ONLY** (312) 279-9150

ITEM	PART NO.	DESCRIPTION
1	BS-X573-1	LARGE DOOR: 3 SLOT
2	BS-8000-12	COIN RETURN CUP DOOR (3 REQ'D.)
3	BS-8000-7	COIN RETURN CUP BEZEL (3 REQ'D.)
4	BS-8000-6	COIN ENTRY CASTING (3 REQ'D.)
5	8000-8	COIN INSERT PLATE (3 REQ'D.)
6	7800-6	DENOMINATION INSERT (3 REQ'D.)
7	7800-37	REJECT BUTTON RETURN SPRING (3 REQ'D.)
8	7300-105	"C" WASHER (3 REQ'D.)
9	7800-11-RED	REJECT BUTTON - RED
10	A7800-12-RED	REJECT BUTTON HOUSING (RED)
11	7800-11-AMBER	REJECT BUTTON - AMBER
12	A7800-12-AMBER	REJECT BUTTON HOUSING (AMBER)
13	7800-11-BLUE	REJECT BUTTON - BLUE
14	A7800-12-BLUE	REJECT BUTTON HOUSING (BLUE)
15	8000-22	WASHER 3/8" O.D. (3 REQ'D.) (NOT SHOWN)
16	8000-24-12	12V WEDGE LAMP (3 REQ'D.)
17	8000-23	WEDGE LAMP SOCKET (3 REQ'D.)
18	8000-14	HOUSING RETAINING BRACKET (3 REQ'D.)
19	8000-9	COIN ENTRY CHUTE (3 REQ'D.)
20	3300-34	"C" WASHER (3 REQ'D.) (NOT SHOWN)
21	8000-21	REJECT LEVER ASSEMBLY (3 REQ'D.)
22	7800-14	TORSION SPRING (3 REQ'D.)
23	7600-141-1	MECHANICAL RETAINING BRACKET (3 REQ'D.)
24	216-6-4	#6-32 X 1/4" PHILLIPS PAN HEAD SCREW (27 REQ'D.)
25	606-110-N	NYLON WASHER (3 REQ'D.) (NOT SHOWN)

COIN DOOR W/CABLE; BLACK 3-CHUTE - PARTS LIST, CONT'D.
PART NO. A982-00014-0021
ORDER FROM COIN MECHANISM BY PART NUMBER **ONLY** (312) 279-9150

ITEM	PART NO.	DESCRIPTION
26	0017-00005-0003	COIN ACCEPTOR W/STRING CUTTER (3 REQ'D.)
27	404-4	#4-40 HEX NUT (6 REQ'D.)
28	8000-10	MECHANICAL MOUNTING BRACKET (3REQ'D.)
29	8000-18	SWITCH CHUTE (SMALL) (3REQ'D.)
30	7300-134	SWITCH INSULATOR (3REQ'D.)
31	7300-100-1	SWITCH (BLUE) (3 REQ'D.)
32	8000-19	5¢ & 25¢ SWITCH WIRE (3 REQ'D.)
33	101-4-16	#4-4 x 1" ROUND HEAD MACHINE SCREW (6 REQ'D.)
34	8000-28	SWITCH COVER (3REQ'D.)
35	8000-13	COIN RETURN CUP (3 REQ'D.)
36	8000-9-1-R	SLAM SWITCH BRACKET
37	7800-42	SLAM SWITCH
38	100-4-6	#4-36 x 3/8" ROUND HEAD MACHINE SCREW (2 REQ'D.)
39	8800-24	DOUBLE BITTED LOCK & KEY W/NUTS
40	X615	LOCKING CAM
41	7800-7	KEY HOOK (NOT SHOWN)
42*	0017-00007-0019	KEY HOOK (NOT SHOWN)
43*	A090-00089-0000	COIN METER ASSEMBLY W/DIODE
44*	A982-00015-0011	FRONT DOOR CABLE ASSEMBLY (INCLUDES THE FOLLOWING 3 ITEMS)
	0017-00021-0297 0017-00042-0004 0017-00041-0627	CONECTOR M-N-L CLAMP CABLE TUBING: PVC BLK. 7"
45*	0017-00009-0609	GROUND STRAP: 7" W/BLACK COVER
46*	0017-00103-0061	NUT: 8-32 HEX W/SEMS (2 REQ'D.)
47*	0017-00103-0084	NUT: 6-32 HEX W/SEMS (2 REQ'D.) (NOT SHOWN)
48*	0017-00104-0019	WASHER: FLAT #6 .145" I.D., .375" O.D., .032" TH. (NOT SHOWN)
*	**NOT PART OF COIN MECHANISM DOOR ASSEMBLY AND MUST BE ORDERED SEPERATELY, FROM BALLY MIDWAY MFG. CO.**	

FIGURE 25. HEADER FLUORESCENT LIGHT ASSEMBLY - PARTS LIST
PART NO. A595-00011-0000

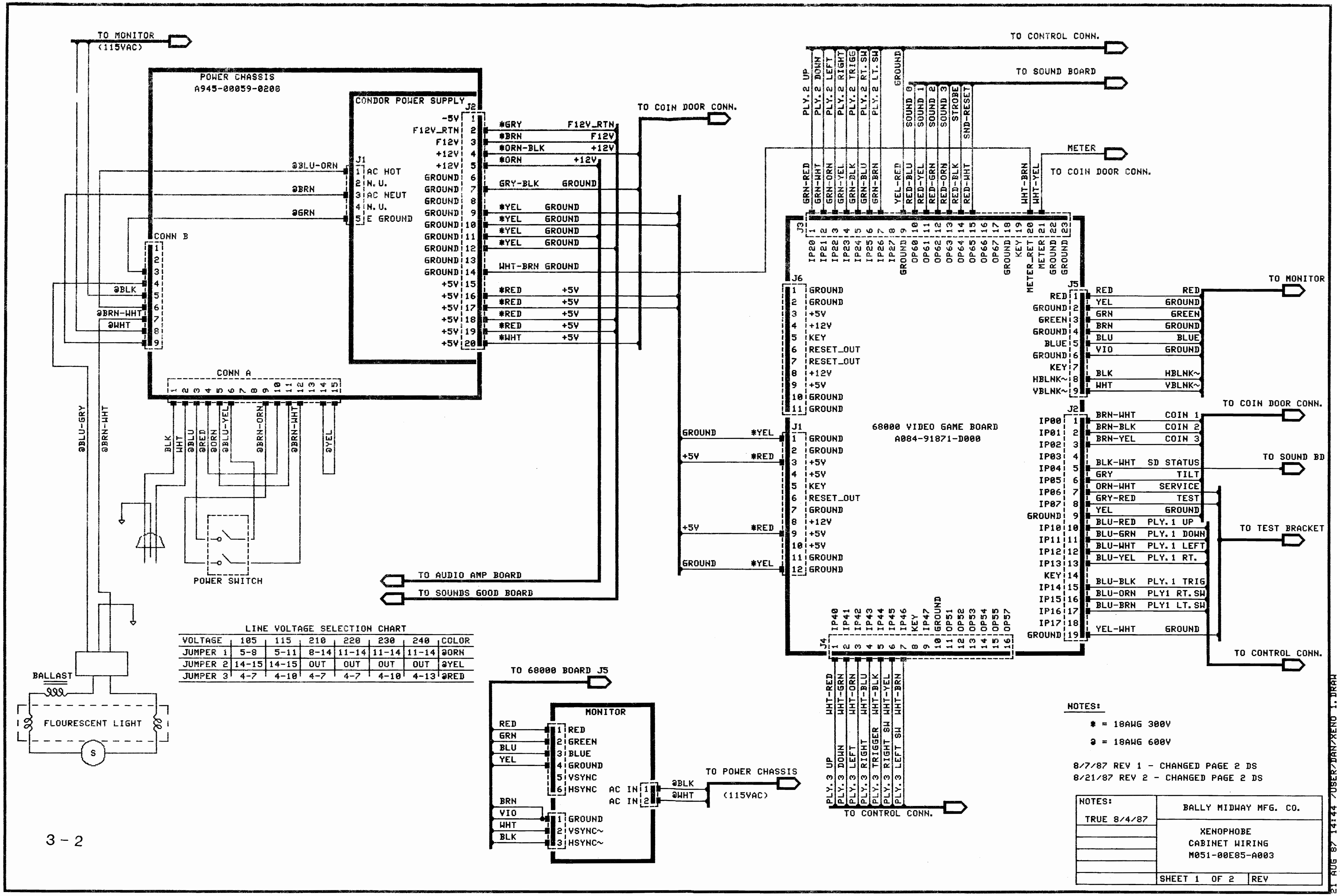


ORDER BY PART NUMBER **ONLY**

ITEM	PART NO.	DESCRIPTION
1	0595-00105-0000	FLUORESCENT BRACKET 18"
2	0017-00003-0043	18" COOL WHITE FLUORESCENT LAMP 15 WATT
3	0017-00003-0445	LAMP LOCKS (2 REQ'D.)
4	0017-00031-0036	FLUORESCENT SOCKET (2 REQ'D.)
5	0017-00003-0412 0017-00101-0347	FLUORESCENT STARTER SOCKET W/12" LEADS (INCLUDES NEXT ITEM) #6-32 x 1/2" PHILLIPS ROUND HEAD MACHINE SCREW (4 REQ'D.)
6	0017-00003-0019	FLUORESCENT STARTER #FS-2
7	0017-00003-0026 0017-00101-0598	BALLAST: STARTER (INCLUDES THE FOLLOWING ITEM) #8-32 x 5/16" SLOTTED HEX HEAD SCREW (4 REQ'D.)

SECTION 3

COMPONENT LAYOUTS, SCHEMATICS & CABINET WIRING DIAGRAM



LINE VOLTAGE SELECTION CHART

VOLTAGE	100	115	210	220	230	240	COLOR
JUMPER 1	5-8	5-11	8-14	11-14	11-14	11-14	@ORN
JUMPER 2	14-15	14-15	OUT	OUT	OUT	OUT	@YEL
JUMPER 3	4-7	4-10	4-7	4-7	4-10	4-13	@RED

NOTES:

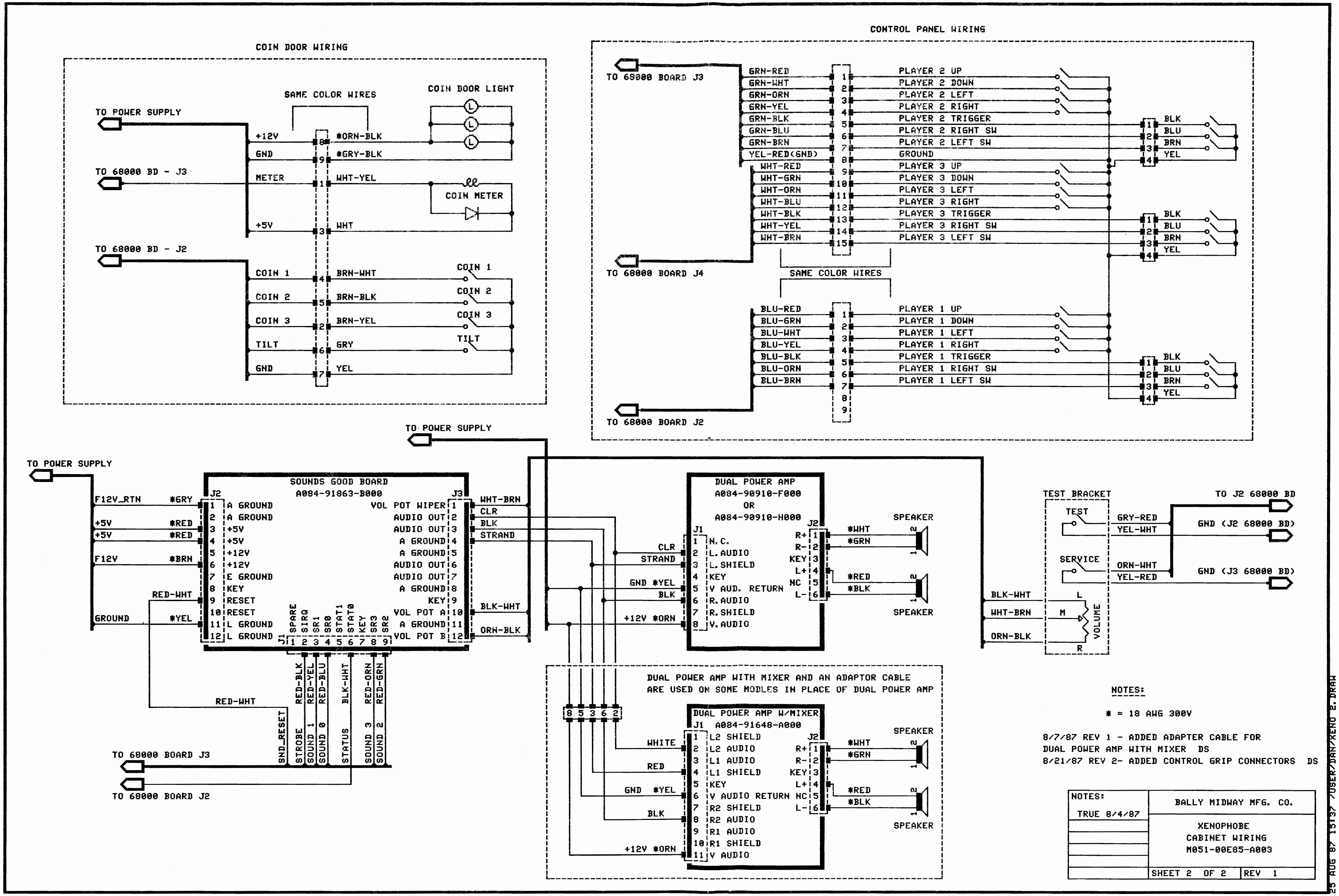
* = 18AWG 300V

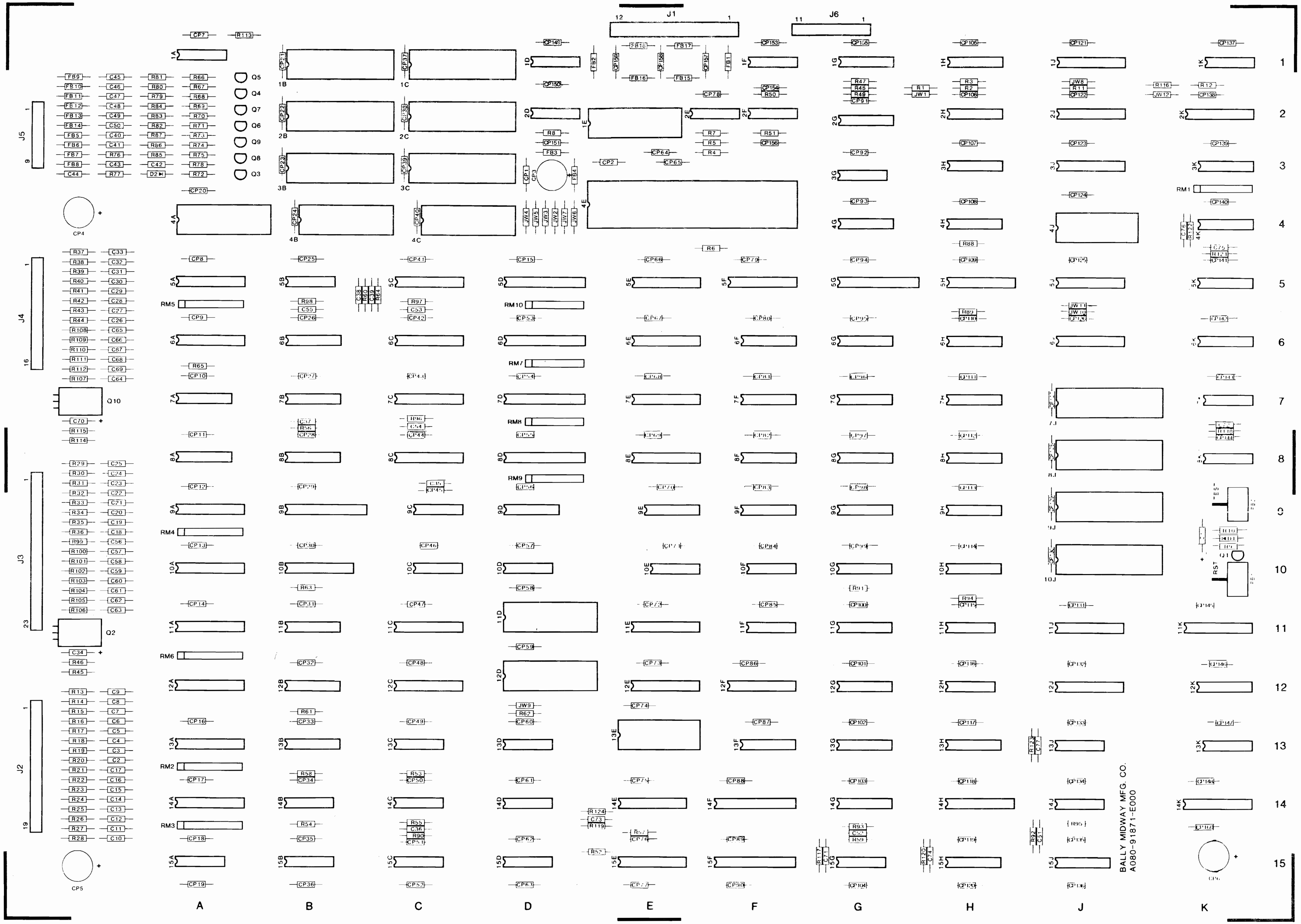
@ = 18AWG 600V

8/7/87 REV 1 - CHANGED PAGE 2 DS
8/21/87 REV 2 - CHANGED PAGE 2 DS

NOTES: TRUE 8/4/87	BALLY MIDWAY MFG. CO.
	XENOPHOBE CABINET WIRING M051-00E85-A003
	SHEET 1 OF 2 REV

21 AUG 87 14144 /USER/DAN/XENO 1.DRAW


COIN DOOR WIRING
SAME COLOR WIRES
COIN DOOR LIGHT
TO POWER SUPPLY
+12V
GND
*ORN-BLK
*GRY-BLK
TO 68000 BD - J3
METER
WHT-YEL
COIN METER
+5V
WHT
TO 68000 BD - J2
COIN 1
BRN-WHT
COIN 2
BRN-BLK
COIN 3
BRN-YEL
TILT
GRY
GND
YEL
CONTROL PANEL WIRING
TO 68000 BOARD J3
GRN-RED
GRN-WHT
GRN-ORN
GRN-YEL
GRN-BLK
GRN-BLU
GRN-BRN
YEL-RED(GND)
WHT-RED
WHT-GRN
WHT-ORN
WHT-BLU
WHT-BLK
WHT-YEL
WHT-BRN
PLAYER 2 UP
PLAYER 2 DOWN
PLAYER 2 LEFT
PLAYER 2 RIGHT
PLAYER 2 TRIGGER
PLAYER 2 RIGHT SW
PLAYER 2 LEFT SW
GROUND
PLAYER 3 UP
PLAYER 3 DOWN
PLAYER 3 LEFT
PLAYER 3 RIGHT
PLAYER 3 TRIGGER
PLAYER 3 RIGHT SW
PLAYER 3 LEFT SW
BLK
BLU
BRN
YEL
TO 68000 BOARD J4
SAME COLOR WIRES
BLU-RED
BLU-GRN
BLU-WHT
BLU-YEL
BLU-BLK
BLU-ORN
BLU-BRN
PLAYER 1 UP
PLAYER 1 DOWN
PLAYER 1 LEFT
PLAYER 1 RIGHT
PLAYER 1 TRIGGER
PLAYER 1 RIGHT SW
PLAYER 1 LEFT SW
TO 68000 BOARD J2
TO POWER SUPPLY
TO POWER SUPPLY
F12V_RTN
*GRY
+5V
*RED
+5V
*RED
F12V
*BRN
RED-WHT
GROUND
*YEL
SOUNDS GOOD BOARD
A084-91863-B000
J2
A GROUND
A GROUND
+5V
+5V
+12V
+12V
E GROUND
KEY
RESET
RESET
L GROUND
L GROUND
J3
VOL POT WIPER
AUDIO OUT
AUDIO OUT
A GROUND
A GROUND
AUDIO OUT
AUDIO OUT
A GROUND
KEY
VOL POT A
A GROUND
VOL POT B
J1
SPARE
SIRQ
SR1
SR0
STAT1
STAT0
KEY
SR3
SR2
WHT-BRN
CLR
BLK
STRAND
BLK-WHT
ORN-BLK
RED-BLK
RED-YEL
RED-BLU
BLK-WHT
RED-ORN
RED-GRN
RED-WHT
SND_RESET
STROBE
SOUND 1
SOUND 0
STATUS
SOUND 3
SOUND 2
TO 68000 BOARD J3
TO 68000 BOARD J2
DUAL POWER AMP
A084-90910-F000
OR
A084-90910-H000
J1
N.C.
L.AUDIO
L.SHIELD
KEY
V AUD. RETURN
R.AUDIO
R.SHIELD
V.AUDIO
CLR
STRAND
GND *YEL
BLK
+12V *ORN
J2
R+
R-
KEY
L+
NC
L-
*WHT
*GRN
*RED
*BLK
SPEAKER
SPEAKER
DUAL POWER AMP WITH MIXER AND AN ADAPTOR CABLE
ARE USED ON SOME MODLES IN PLACE OF DUAL POWER AMP
DUAL POWER AMP W/MIXER
J1 A084-91648-A000
L2 SHIELD
L2 AUDIO
L1 AUDIO
L1 SHIELD
KEY
V AUDIO RETURN
R2 SHIELD
R2 AUDIO
R1 AUDIO
R1 SHIELD
V AUDIO
WHITE
RED
GND *YEL
BLK
+12V *ORN
SPEAKER
SPEAKER
TEST BRACKET
TEST
SERVICE
GRY-RED
YEL-WHT
ORN-WHT
YEL-RED
TO J2 68000 BD
GND (J2 68000 BD)
GND (J3 68000 BD)
BLK-WHT
WHT-BRN
ORN-BLK
VOLUME
NOTES:
* = 18 AWG 300V
8/7/87 REV 1 - ADDED ADAPTER CABLE FOR
DUAL POWER AMP WITH MIXER DS
8/21/87 REV 2- ADDED CONTROL GRIP CONNECTORS DS
NOTES:
TRUE 8/4/87
BALLY MIDWAY MFG. CO.
XENOPHOBE
CABINET WIRING
M051-00E85-A003
SHEET 2 OF 2
REV 1
25 AUG 87 15:37 /USER/DAN/XENO 2.DRAW



3/19 Released for Production ...

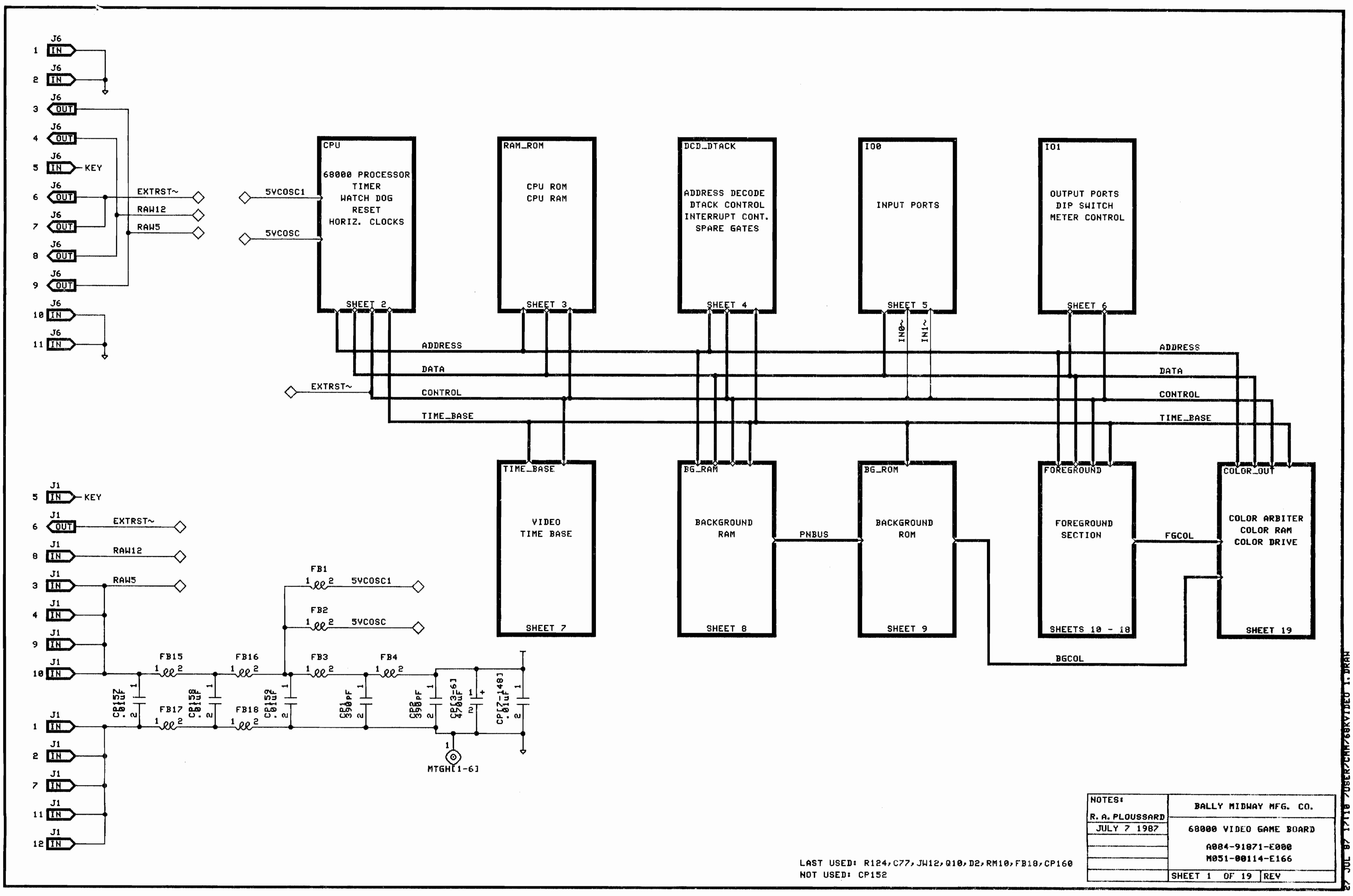
REVISIONS

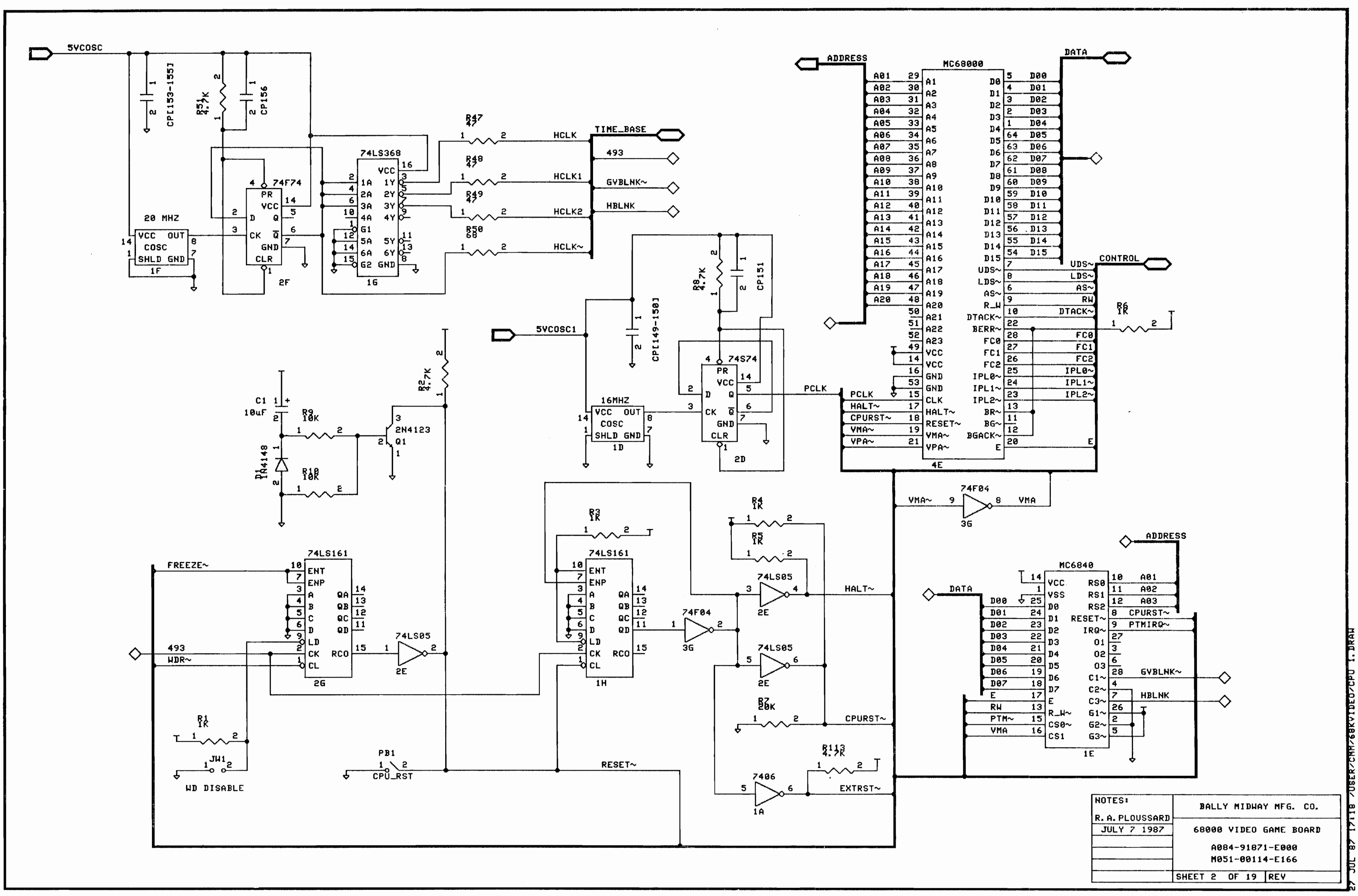
PROJECT ENG: C. MEDNICK			USED ON 0B75	Bally / MIDWAY MFG. CO. FRANKLIN PK. ILL.
DO NOT SCALE DWG.	HEAT TREAT	SCALE FULL	NO. REQ'D 1 PER	
DIM. TOLERANCES UNLESS SPECIFIED CONCENTRICITY T.I.R. .003 FRACTIONAL ±1/64 DECIMAL ±.005 HOLE DIA +.002 -.000	DRN. PBS 3/19/87 CKD. CMM DATE 3/19/87	MAT'L. FINISH	ASSEMBLY DRAWING 68000 VIDEO GAME BOARD (A084-91871-E000)	PART NO. M051-00114-E164

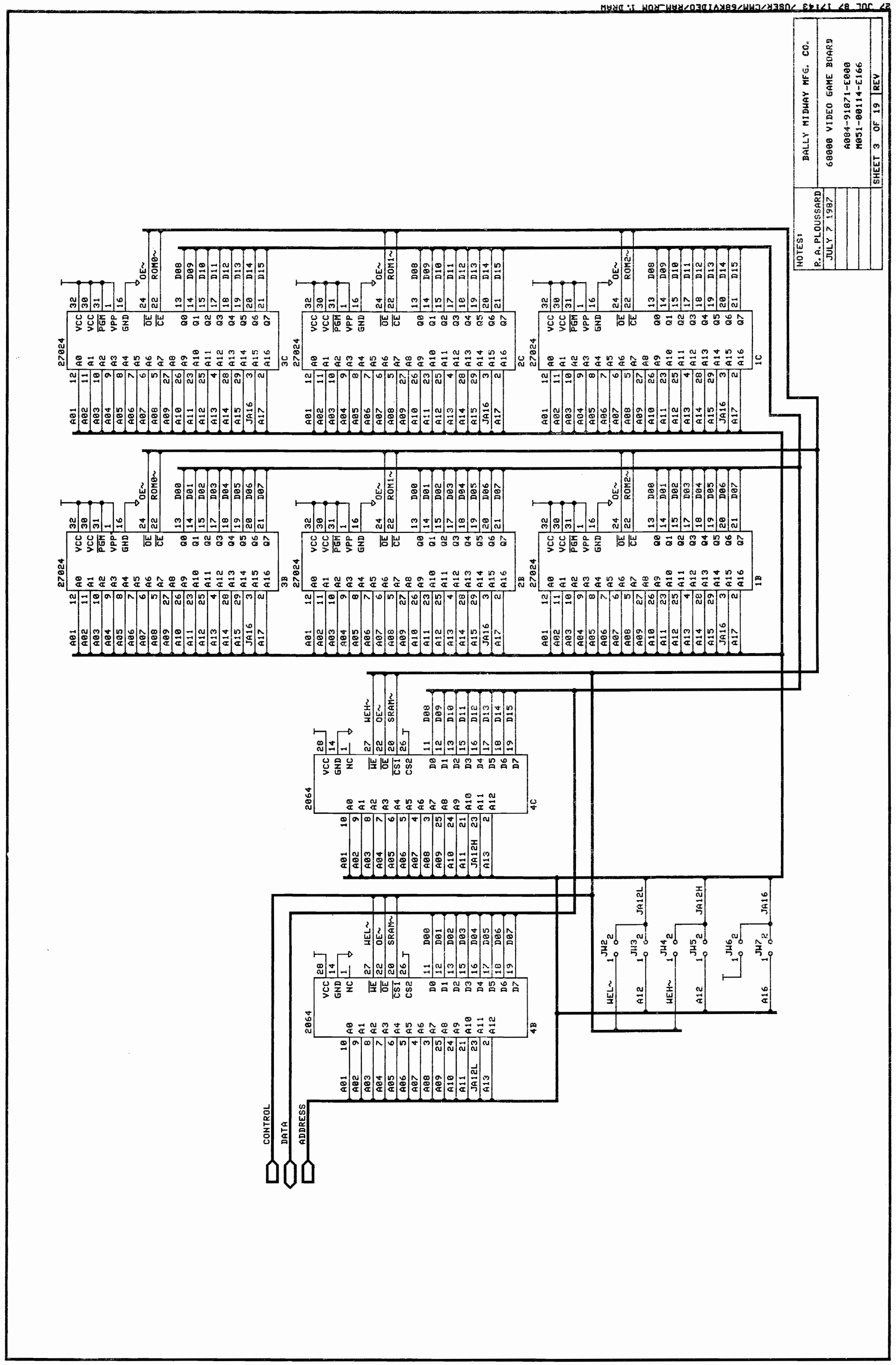
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E165

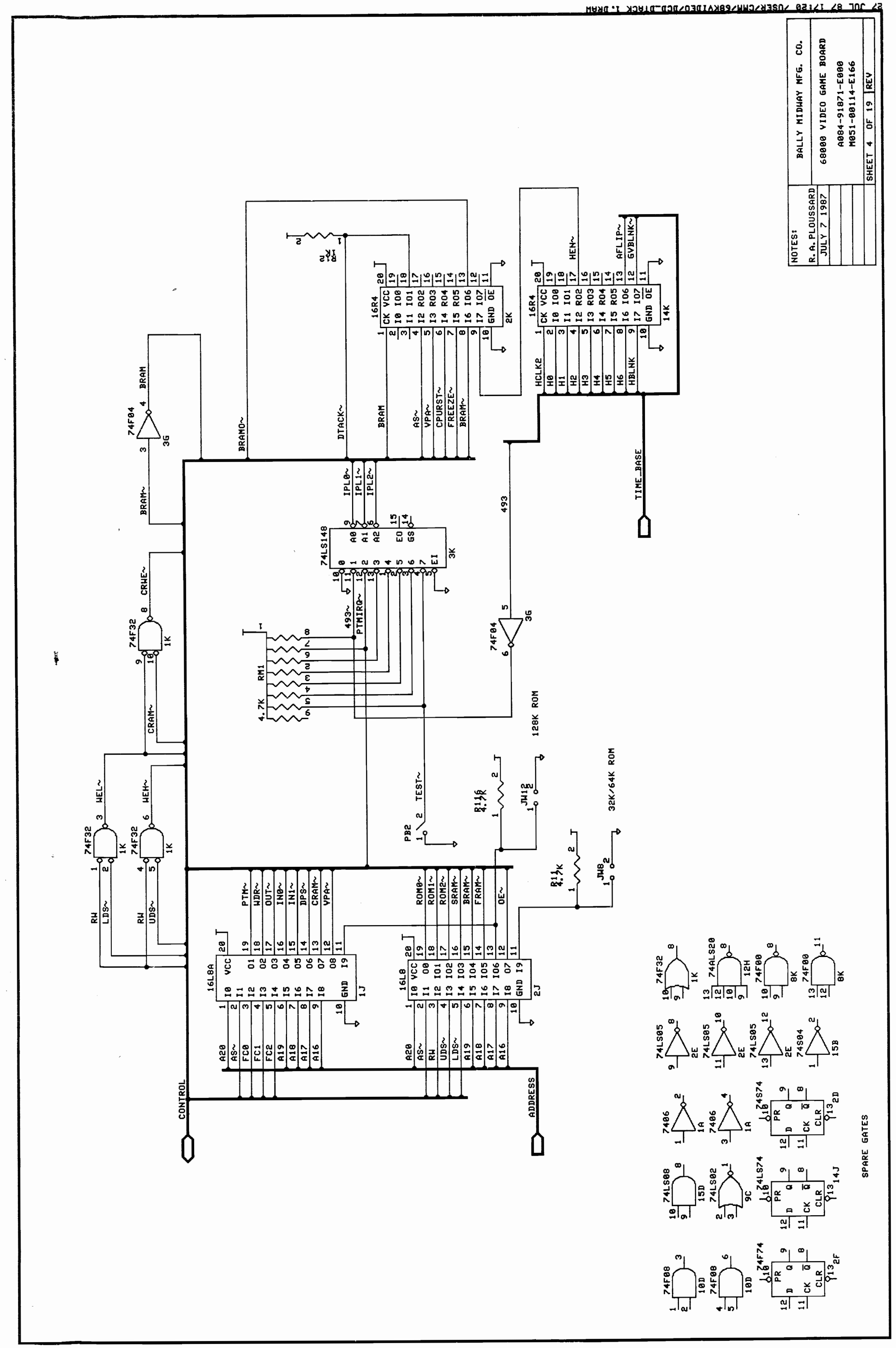
DESCRIPTION	QTY	DESIGNATION	PART NUMBER
10 pF AX CR	3	C71 C55 C72	0360-00800-0038
18pF AX CR	4	C37 C38 C73 C75	0365-00800-0026
33pF AX CR	2	C51 C74	0986-00800-0300
47pF AX CR	6	C45-C50	0986-00800-2800
68pF AX CR	5	C39 C53 C54 C76 C77	0360-00800-0028
100pF AX CR	32	C2-C33	0360-00800-0046
390pF AX CR	4	CP1 CP2 C35 C42	0986-00800-3000
820pF AX CR	18	C40 C41 C43 C44 C56-C69	0945-00816-0400
.01uF AX CR	155	C36 C52 CP[7-151,153-160]	0986-00800-2000
10uF AX TANT	3	C1 C34 C70	0986-00800-0700
470uF RD ELEC	4	CP3-CP6	0B75-00803-0001
10 OHM 1/4W 5% RES	6	R79 R80 R82 R83 R85 R86	100E-00005-0011
22 OHM 1/4W 5% RES	3	R52 R57 R124(PART OF MOD.)	100E-00005-0016
47 OHM 1/4W 5% RES	3	R47 R48 R49	100E-00005-0025
68 OHM 1/4W 5% RES	3	R50 R53 R90	100E-00005-0029
82 OHM 1/4W 5% RES	6	R60 R96 R97 R120 R121 R123	100E-00005-0031
100 OHM 1/4W 5% RES	15	R92 R99-R112	100E-00005-0033
200 OHM 1/4W 5% RES	7	R56 R64 R98 R117-R119 R122	100E-00005-0040
470 OHM 1/4W 5% RES	3	R81 R84 R87	100E-00005-0051
510 OHM 1/4W 5% RES	3	R68 R71 R75	100E-00005-0053
560 OHM 1/4W 5% RES	3	R76 R77 R78	100E-00005-0054
680 OHM 1/4W 5% RES	1	R58	100E-00005-0056
1K OHM 1/4W 5% RES	10	R1 R3-R6 R12 R67 R70 R72 R74	100E-00005-0061
2K OHM 1/4W 5% RES	3	R66 R69 R73	100E-00005-0068
2.7K OHM 1/4W 5% RES	4	R45 R46 R114 R115	100E-00005-0071
4.7K OHM 1/4W 5% RES	19	R2 R8 R11 R51 R54 R55 R59 R61 R62 R63 R65 R88 R89 R91 R93 R94 R95 R113 R116	100E-00005-0079
10K OHM 1/4W 5% RES	34	R9 R10 R13-R44	100E-00005-0088
20K OHM 1/4W 5% RES	1	R7	100E-00005-0095
1K 9 PIN SIP	4	RM7 RM8 RM9 RM10	102E-00004-0011
4.7K 9 PIN SIP	1	RM1	102E-00004-0024
4.7K 10 PIN SIP	1	RM6	102E-00004-0026
100K 10 PIN SIP	4	RM2 RM3 RM4 RM5	102E-00004-0045
1N4148 DIODE	2	D1 D2	103E-00002-0005
2N4123 NPN XSTR	2	Q1 Q3	104E-00001-0007
MPSA70 PNP XSTR	6	Q4 Q5 Q6 Q7 Q8 Q9	104E-00002-0012
TIP110 NPN XSTR	2	Q2 Q10	104E-00009-0001
COSC 16MHz	1	1D	109E-00002-0001
COSC 20MHz	1	1F	0304-00804-0007
7406	1	1A	0986-00803-7600
74ALS20	1	12H	0A59-00803-0015
74F00	2	11F 8K	0A59-00803-0001
74F04	1	3G	0A59-00803-0034
74F08	1	10D	0A59-00803-0030
74F32	1	1K	0304-00803-0059
74F74	2	2F 11H	0A59-00803-0003
74F86	2	13C 13K	0A59-00803-0031
74F157	4	14G 13F 13G 5K	0A59-00803-0004
74F174	1	12K	0A59-00803-0005
74HCT244	4	14A 9A 5A 13A	0B75-00803-0001
74S04	2	15B 15C	0986-00803-6600
74S74	1	2D	0A15-00803-0023
74LS00	1	5B	0304-00803-0010
74LS02	1	9C	0986-00803-7400
74LS05	1	2E	0A15-00803-0011
74LS08	1	15D	0986-00803-7300
74LS20	3	13D 10E 15A	0986-00803-1004
74LS32	2	14D 13J	0986-00803-6100
74LS74	5	15G 14J 10F 14B 14C	0986-00803-1005
74LS86	2	10C 7K	0986-00803-9900
74LS148	1	3K	0A15-00803-0067
74LS153	2	11B 12B	0A59-00803-0006
74LS157	6	8A 7A 4K 4H 3H 2H	0304-00803-0021
74LS161	2	1H 2G	0986-00803-1003
74LS163	3	4G 6G 6H	0A59-00803-0008
74LS169	4	9F 8F 6F 7F	0304-00803-0023
74LS173	1	6K	0A59-00803-0009
74LS174	4	13B 8B 15H 13H	0304-00803-0024
74LS175	1	15J	0304-00803-0025
74LS194	8	8G 9H 7H 10G 9G 7G 8H 10H	0304-00803-0026
74LS244	2	5H 11A	0986-00803-4800
74LS245	2	12F 3J	0986-00803-6400
74LS258	2	9E 9D	0304-00803-0028
74LS273	6	10B 12C 11C 11K 10A 6A	0986-00803-4700
74LS283	2	11G 12G	0304-00803-0030
74LS298	2	7B 6B	0A59-00803-0010
74LS368	1	1G	0A59-00803-0011
74LS374	8	5E 6E 7E 8E 6C 7C 8C 5C	0986-00803-4600

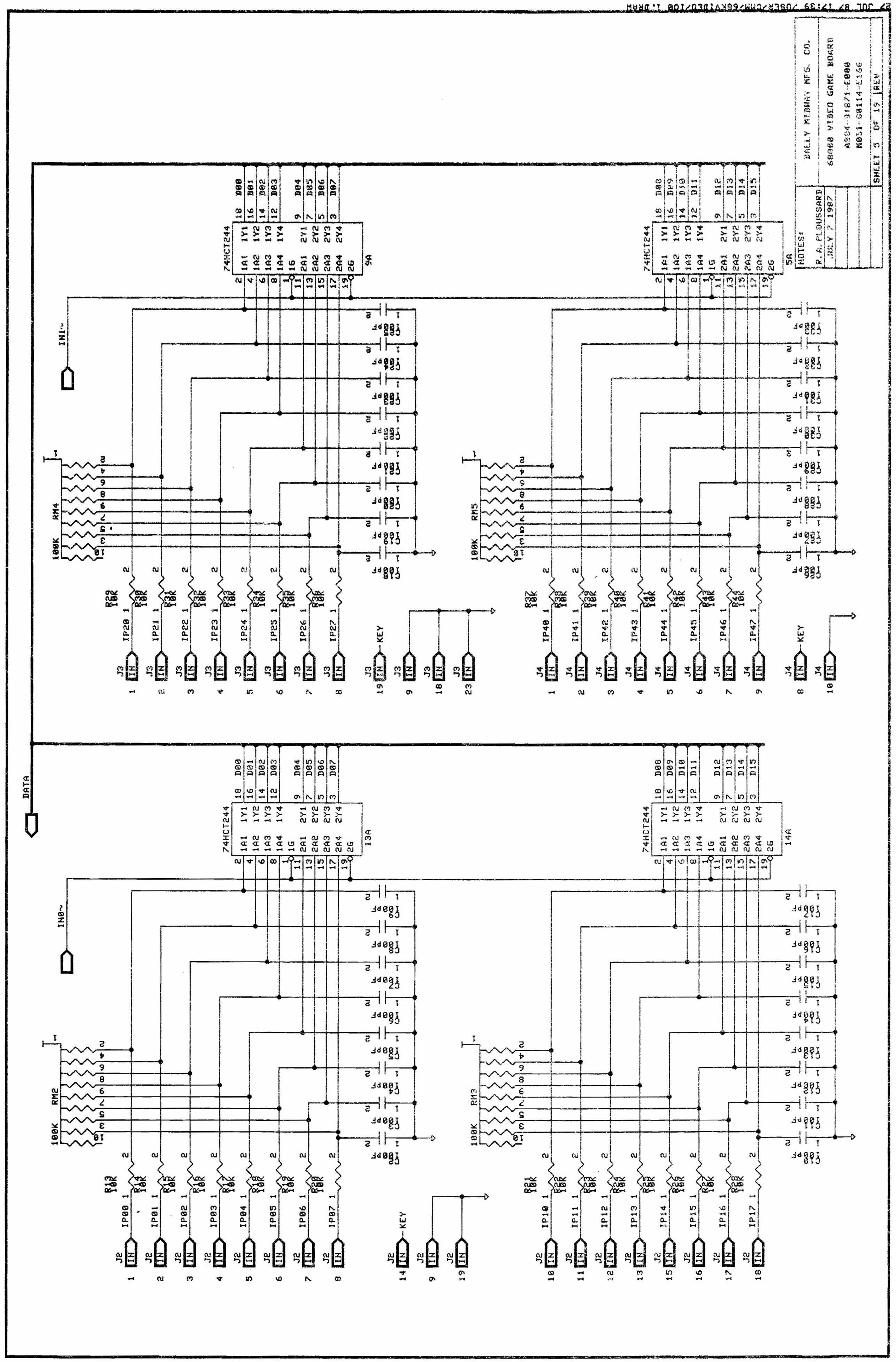
DESCRIPTION	QTY	DESIGNATION	PART NUMBER
74LS377	5	12E 11E 5J 6J 5F	0A59-00803-0012
PACOUT REV 1 PLA	1	11J	A59A-26AXL-AXHD
PACNS REV 1 PLA	1	12J	A59A-26AXL-BXHD
ROMCTRL REV 1 PLA	1	14H	A59A-26AXL-CXHD
MMC02B HAL	1	14F	0986-00803-9000
MMC01A HAL	1	15F	0986-00803-8900
MMC06 HAL	1	14E	0986-00803-9200
MMC03B HAL	1	15E	0986-00803-9100
COLARB PAL20L8	1	9B	0E61-00803-0001
IODCD PAL16L8	1	1J	0B75-00803-0003
MEMDCD PAL16L8	1	2J	0B75-00803-0004
DTACK PAL16R4	1	2K	0B75-00803-0005
HSYNC PAL16R4	1	14K	0B75-00803-0006
93419 64x9 RAM	1	4A	0986-00803-9600
2018 2Kx8 RAM 45nS	4	8D 7D 5D 6D	0A59-00803-0028
2018 2Kx8 RAM 55nS	1	5G	0A59-00803-0029
2064 8Kx8 RAM 150nS	2	4B 4C	0A15-00803-0079
6116 2Kx8 RAM 150nS	1	4J	0A59-00803-0027
6116 2Kx8 RAM 120nS	1	13E	0A59-00803-0014
MC68000	1	4E	0304-00803-0051
MC6840	1	1E	0A15-00803-0068
ROM/EPROMS	12	1B-3B 1C-3C 7J-10J 11D 12D	SEE ROM/EPROM CHART
16 PIN IC SOCKET(.3)	1	1G 4K	110E-00001-0003
20 PIN IC SOCKET(.3)	9	1J 2J 2K 14K 14E 15E 11J 12J 14H	110E-00001-0005
24 PIN IC SOCKET(.3)	8	14F 15F 5G 5D 6D 7D 8D 9B	110E-00001-0009
24 PIN IC SOCKET(.6)	2	13E 4J	110E-00001-0007
28 PIN IC SOCKET(.6)	12	1B-4B 1C-4C 11D 12D 1E 4A	110E-00001-0010
32 PIN IC SOCKET(.6)	4	7J-10J	110E-00001-0024
64 PIN IC SOCKET(.9)	1	4E	110E-00001-0016
AUTO INSERT PIN .025	73	J2 J3 J4 J5 J6	0304-00804-0009
AUTO INSERT PIN .045	11	J1	0304-00804-0010
FERRITE BEADS	18	FB1-FB18	0316-00804-0002
JUMPERS	12	JW1-JW12	117E-00001-0003
SWITCH PC MTG.	2	PB1 PB2	0986-00804-3100
DIP SWITCH 10 POS	1	12A	113E-00001-0004
SNAP	2	Q2 Q10	0017-00007-0134
PC BOARD	1		A080-91871-E000

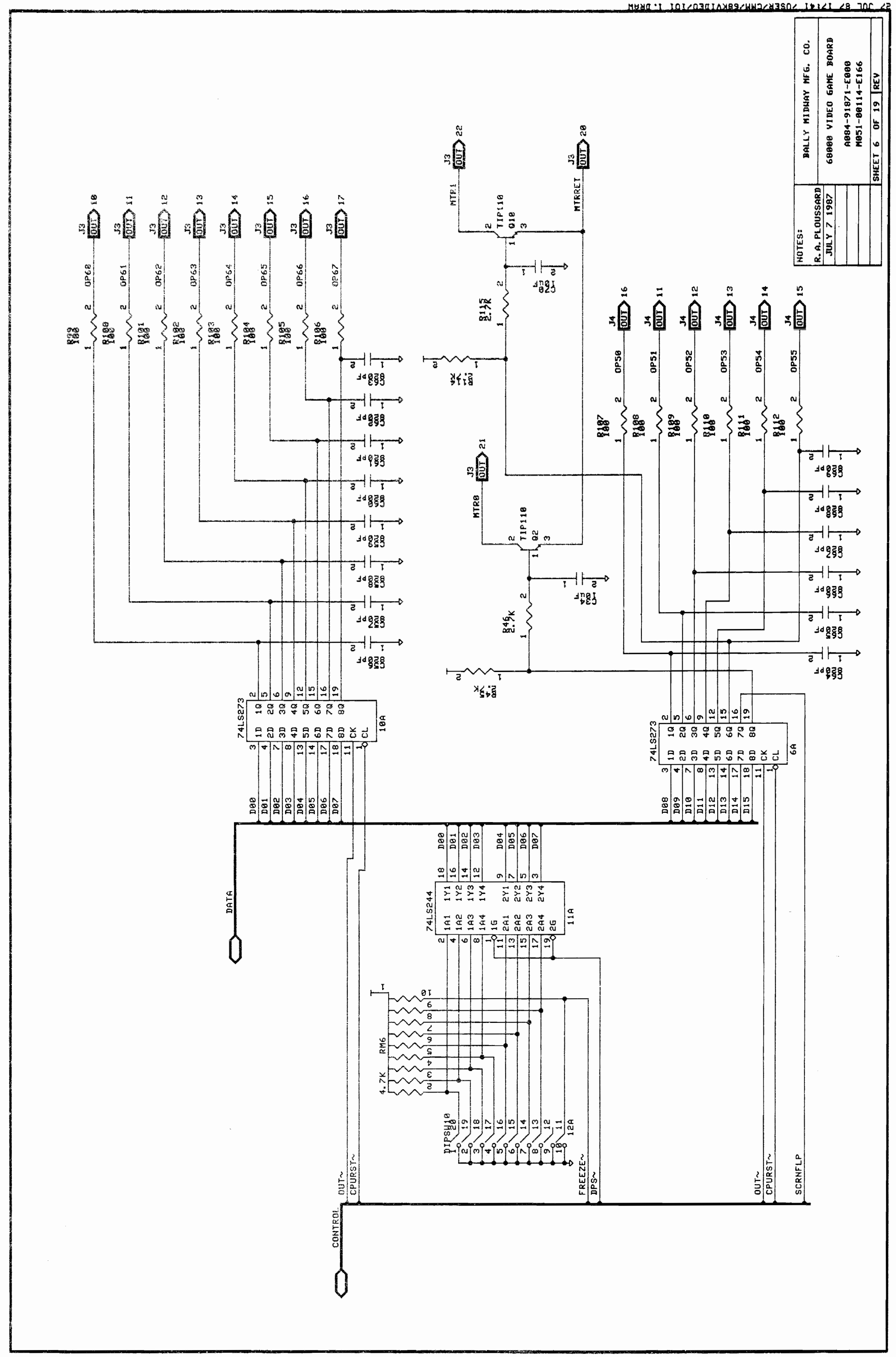

CPU
68000 PROCESSOR
TIMER
WATCH DOG
RESET
HORIZ. CLOCKS
SHEET 2
RAM_ROM
CPU ROM
CPU RAM
SHEET 3
DCD_DTACK
ADDRESS DECODE
DTACK CONTROL
INTERRUPT CONT.
SPARE GATES
SHEET 4
IO0
INPUT PORTS
SHEET 5
IO1
OUTPUT PORTS
DIP SWITCH
METER CONTROL
SHEET 6
TIME_BASE
VIDEO
TIME BASE
SHEET 7
BG_RAM
BACKGROUND
RAM
SHEET 8
BG_ROM
BACKGROUND
ROM
SHEET 9
FOREGROUND
FOREGROUND
SECTION
SHEETS 10 - 18
COLOR_OUT
COLOR ARBITER
COLOR RAM
COLOR DRIVE
SHEET 19
ADDRESS
DATA
CONTROL
TIME_BASE
PNBUS
FGCOL
BGCOL
EXTRST~
RAW12
RAW5
5VCOSC1
5VCOSC
KEY
MTGH[1-6]
LAST USED: R124,C77,JW12,Q10,D2,RM10,FB18,CP160
NOT USED: CP152
NOTES:
R.A.PLOUSSARD
JULY 7 1987
BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91071-E000
M051-00114-E166
SHEET 1 OF 19 REV
27 JUL 87 17:18 /USER/CMR/68KVIDEO/VIDEO 1.DRAW

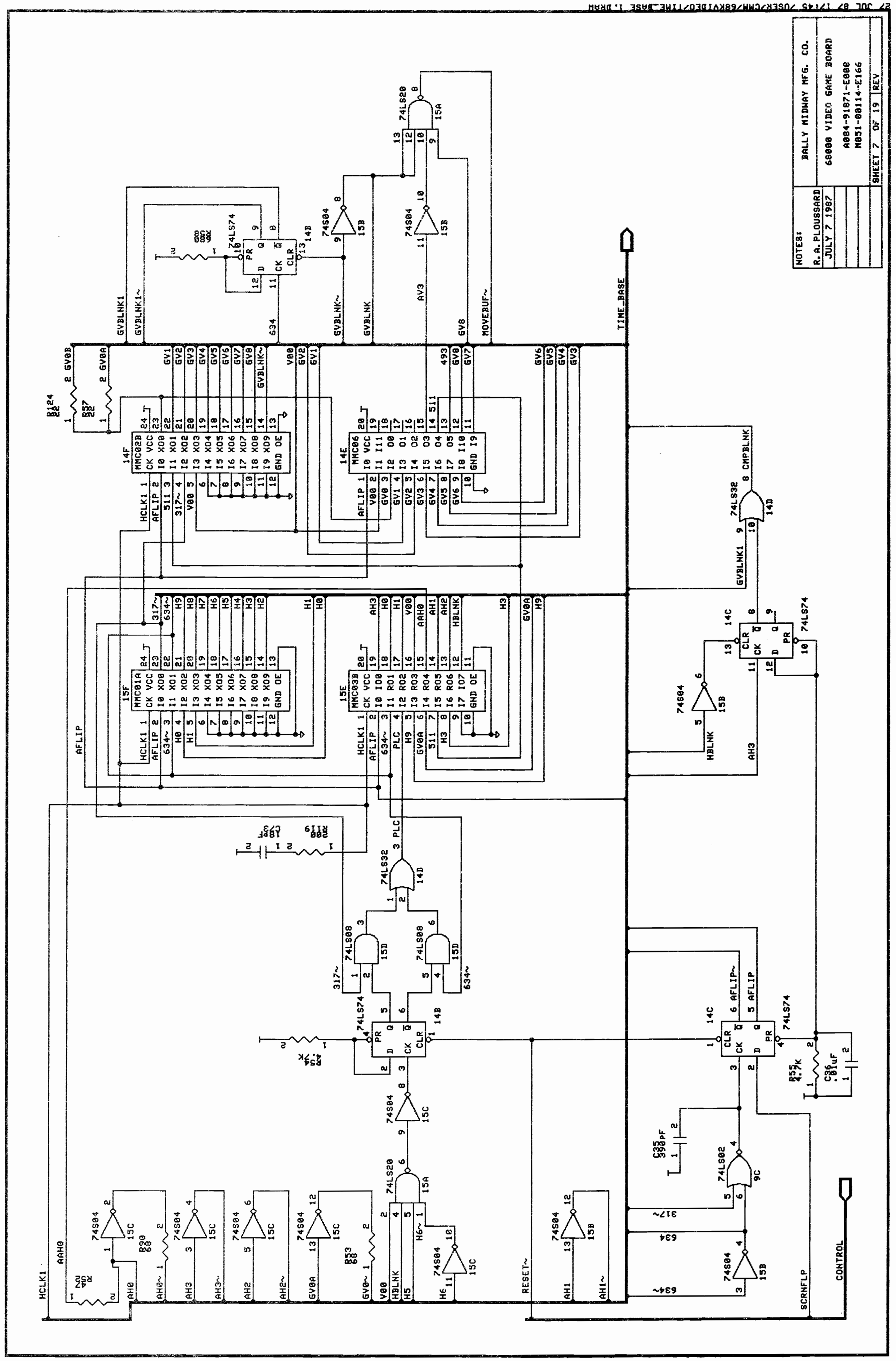

5VCOSC
20 MHZ
74F74
74LS368
TIME_BASE
HCLK
HCLK1
HCLK2
HCLK~
493
GVBLNK~
HBLNK
MC68000
ADDRESS
DATA
CONTROL
5VCOSC1
16MHZ
74S74
PCLK
2N4123
74LS161
74LS05
74F04
7406
MC6840
FREEZE~
WDR~
WD DISABLE
CPU_RST
RESET~
HALT~
CPURST~
EXTRST~
VMA~
VMA
NOTES:
R.A.PLOUSSARD
JULY 7 1987
BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91071-E000
M051-00114-E166
SHEET 2 OF 19 REV
27 JUL 87 17:18 /USER/CMR/68KVIDEO/CPU 1.DRAW

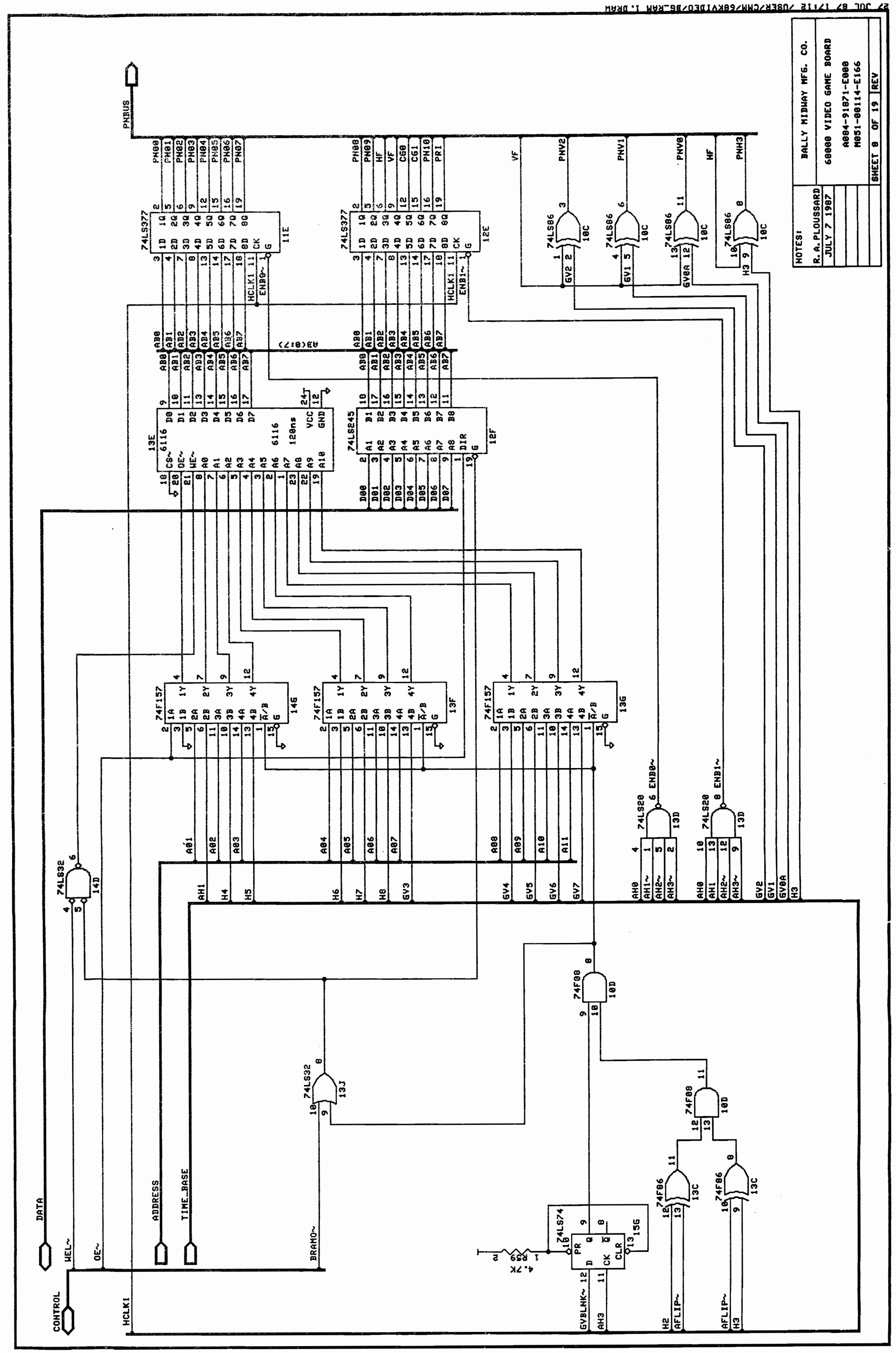

BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 3 OF 19
R.A. PLOUSSARD
JULY 7 1987

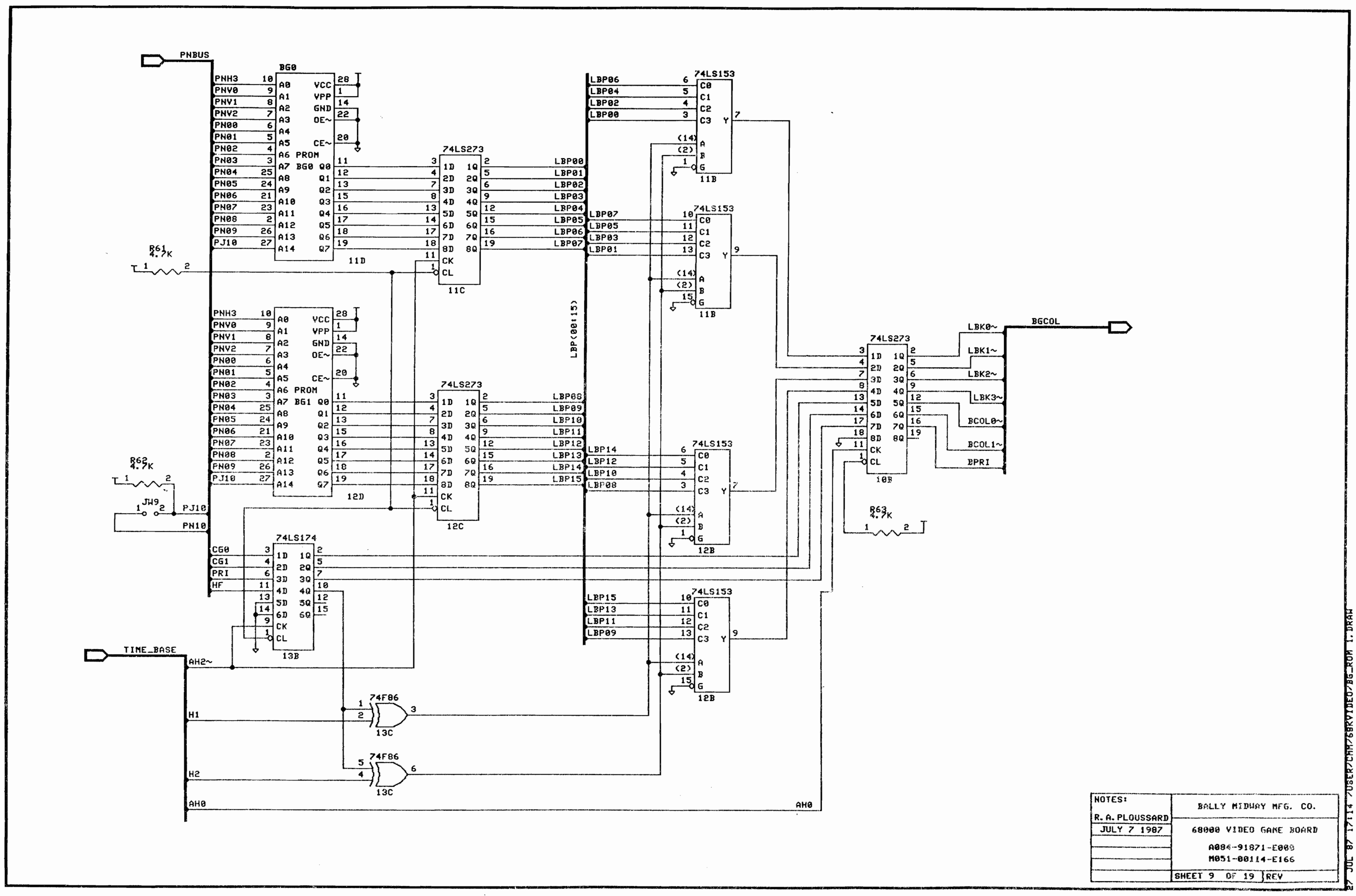

BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 4 OF 19
R.A. PLOUSSARD
JULY 7 1987
SPARE GATES

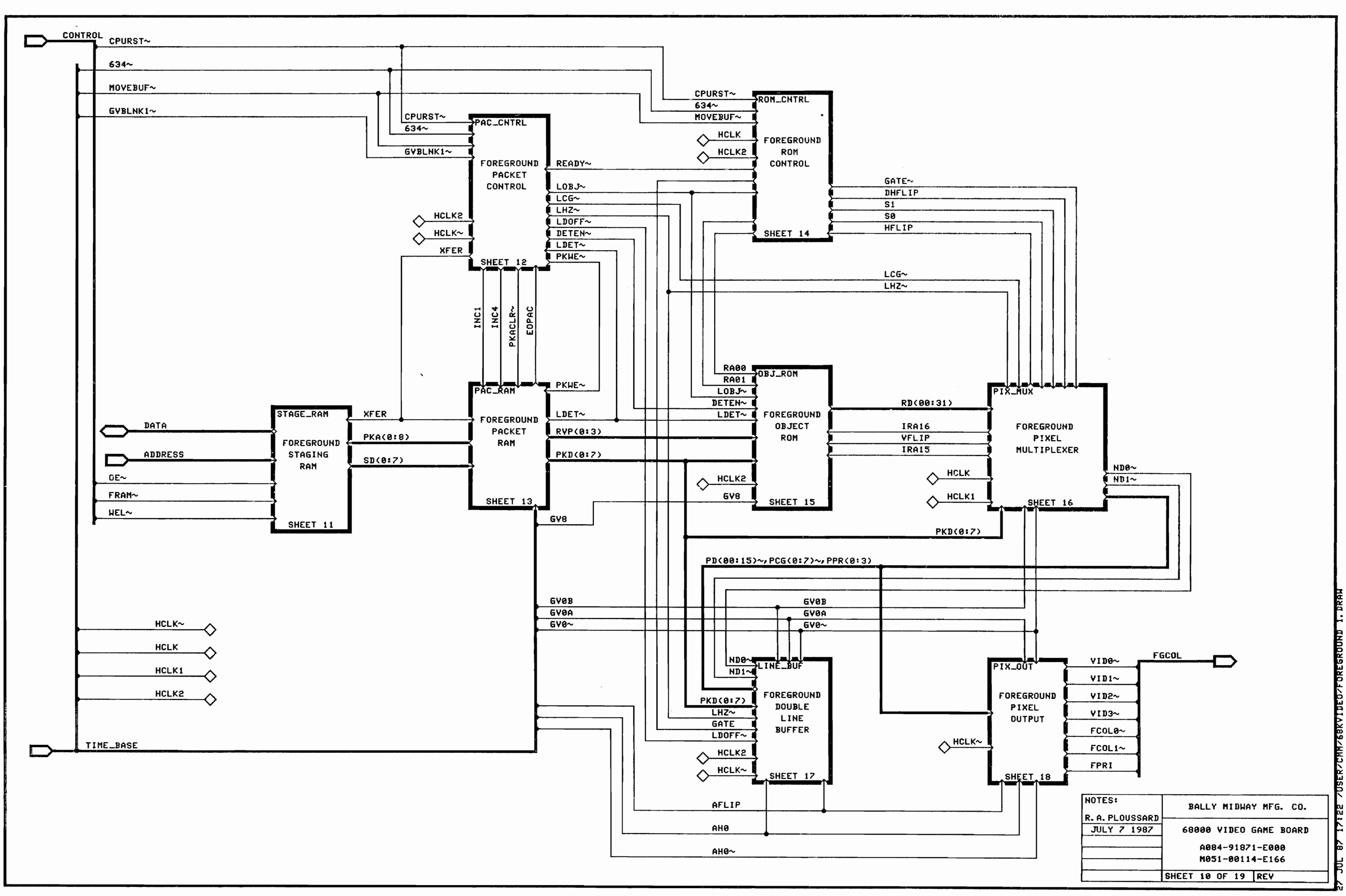

BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 5 OF 19 REV
NOTES:
R.A.PLOUSSARD
JULY 7 1987

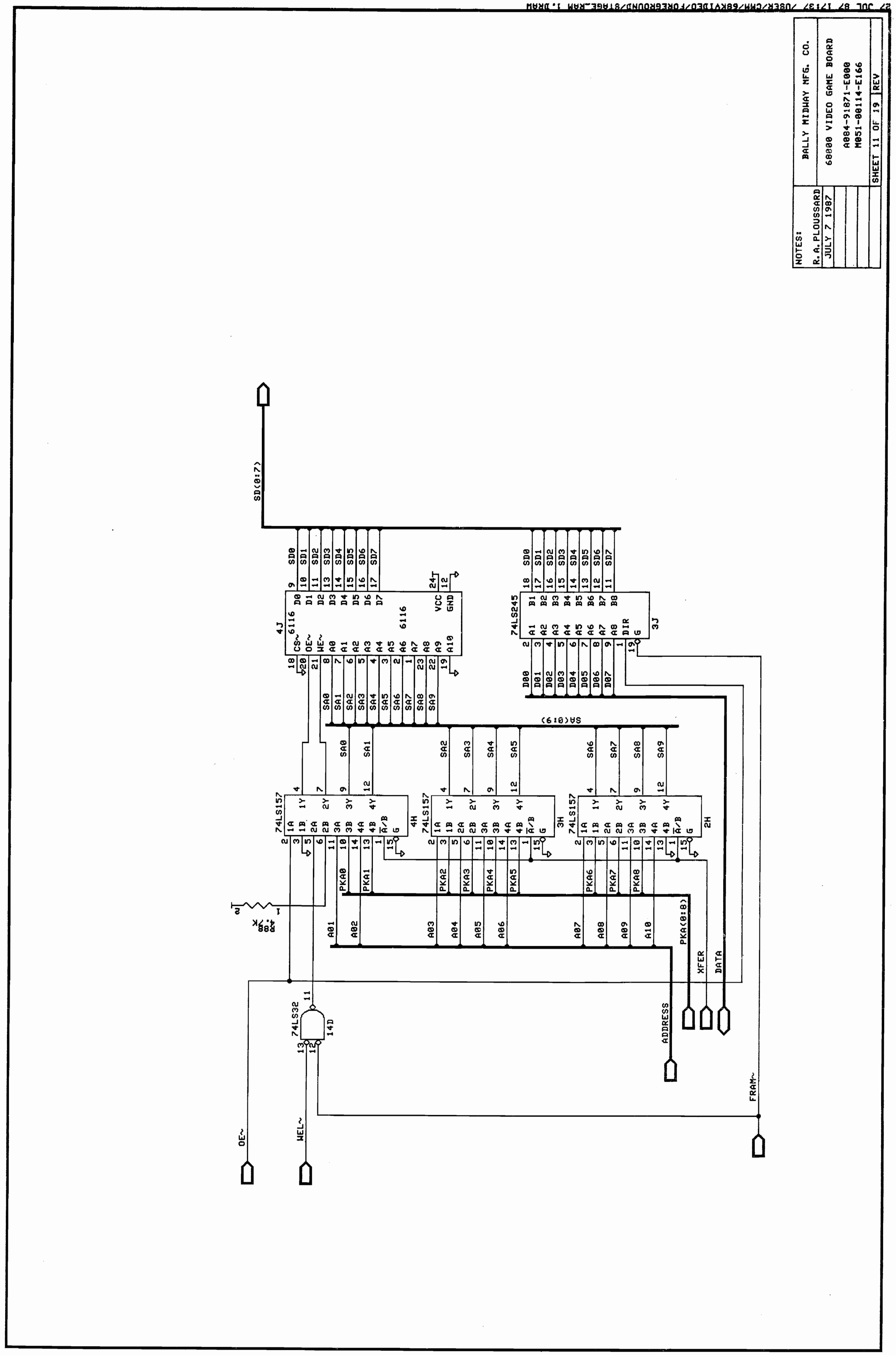

BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 6 OF 19 REV
NOTES:
R.A.PLOUSSARD
JULY 7 1987

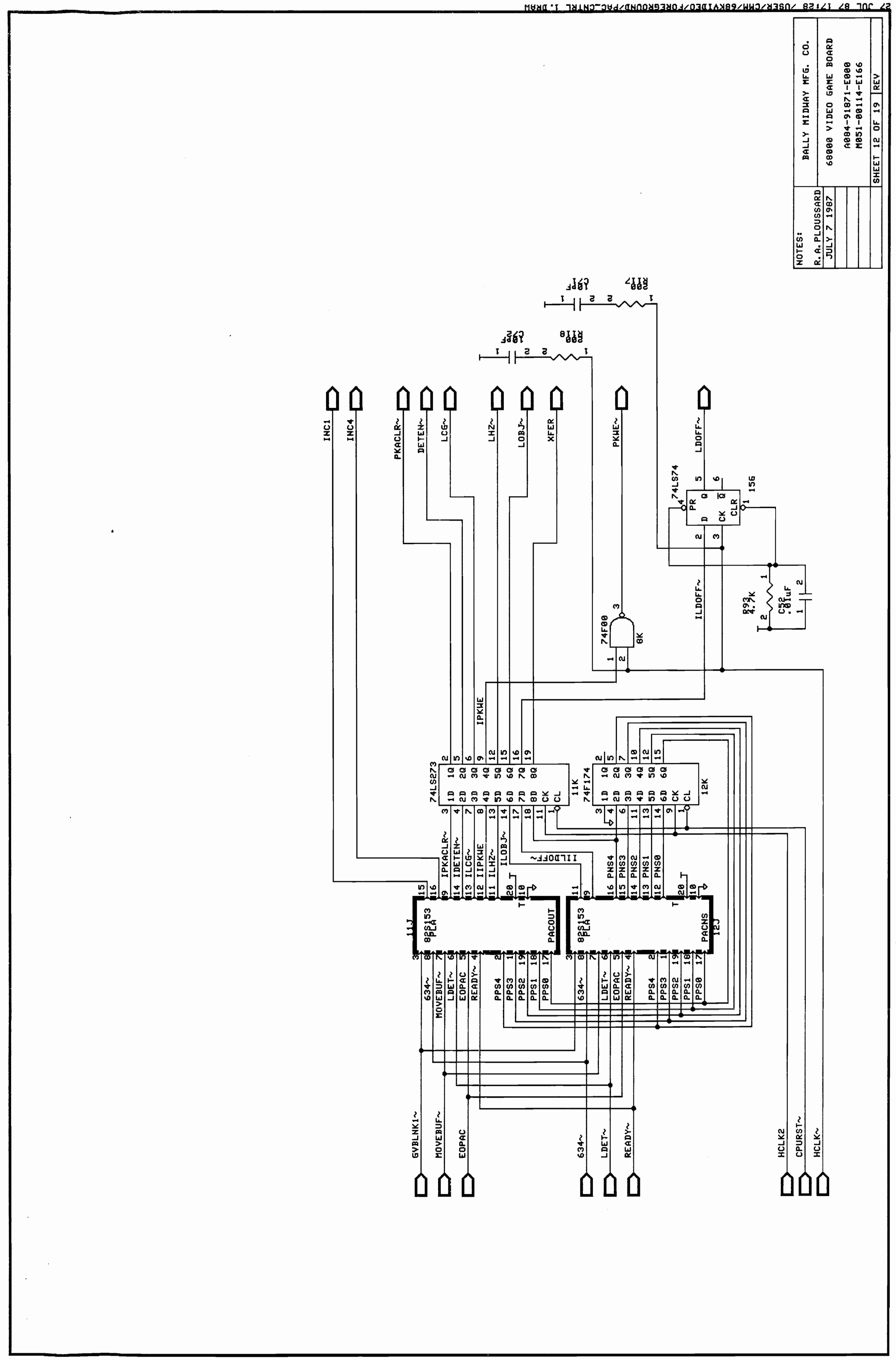

BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 7 OF 19
REV
NOTES:
R.A.PLOUSSARD
JULY 7 1987
TIME_BASE
CONTROL

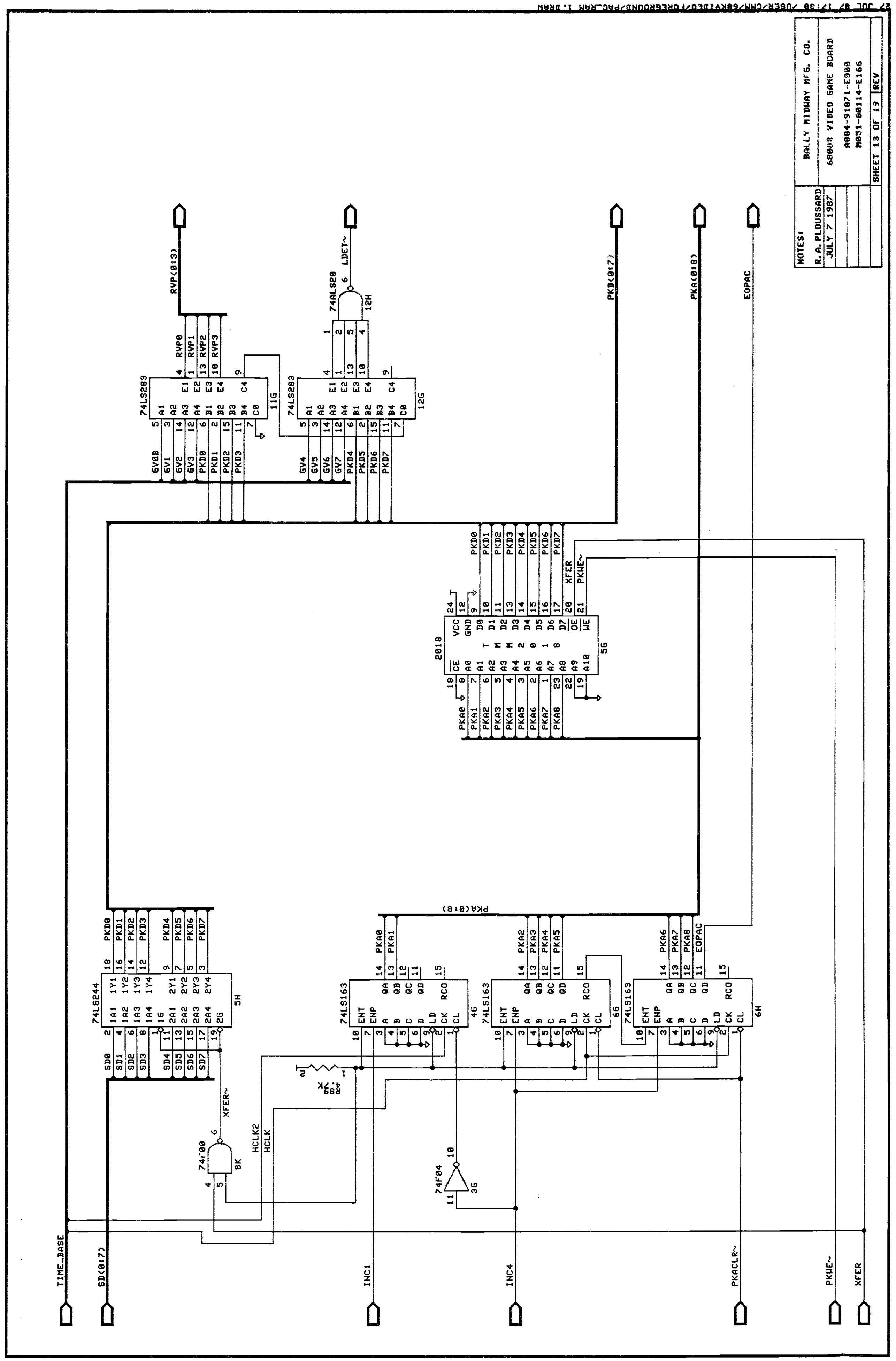

BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 8 OF 19
REV
NOTES:
R.A.PLOUSSARD
JULY 7 1987
PHBUS
DATA
ADDRESS
TIME_BASE
CONTROL

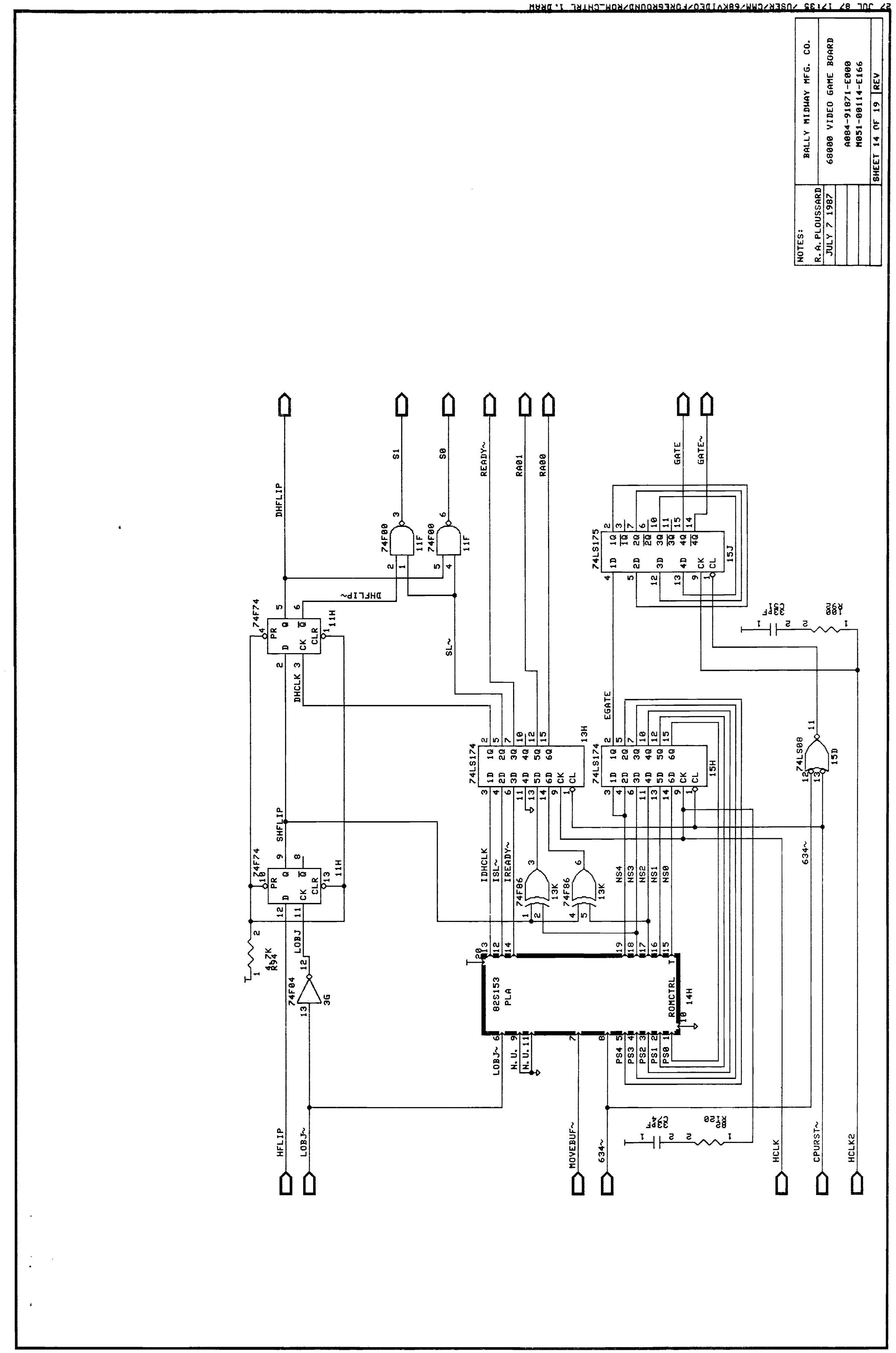

PNBUS
BG0
PROM BG0
BG1
PROM
74LS273
11C
12C
11D
12D
74LS153
11B
12B
74LS174
13B
74F86
13C
74LS273
10B
LBP(00:15)
R61 4.7K
R62 4.7K
R63 4.7K
JW9
PJ10
PN10
TIME_BASE
AH2~
H1
H2
AH0
BGCOL
LBK0~
LBK1~
LBK2~
LBK3~
BCOL0~
BCOL1~
BPRI
NOTES:
R. A. PLOUSSARD
JULY 7 1987
BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 9 OF 19
REV
27 JUL 87 17:14 /USER/CHM/68KVIDEO/BG_ROM 1.DRAW

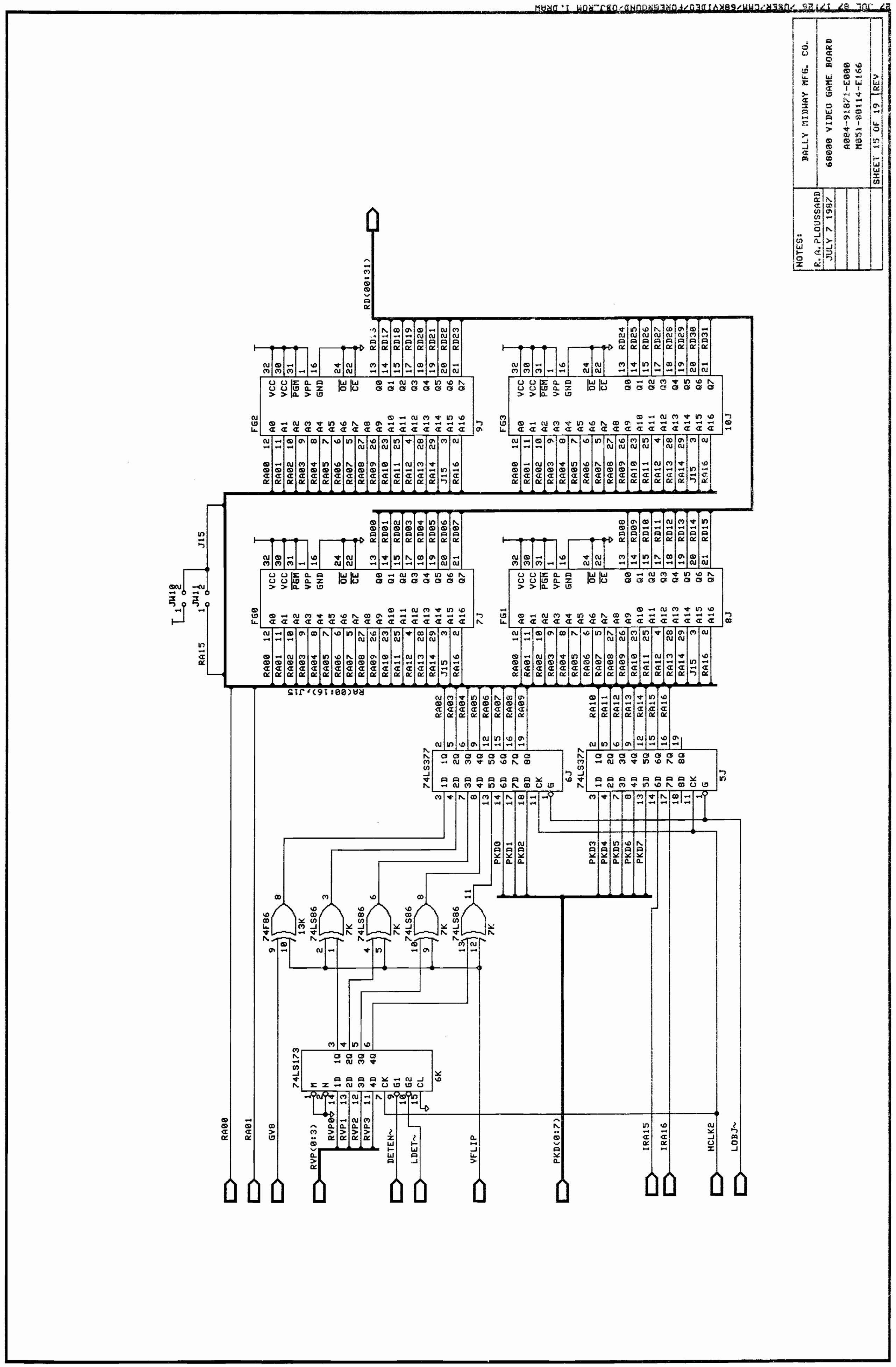

CONTROL
CPURST~
634~
MOVEBUF~
GVBLNK1~
PAC_CNTRL
FOREGROUND PACKET CONTROL
SHEET 12
ROM_CNTRL
FOREGROUND ROM CONTROL
SHEET 14
STAGE_RAM
FOREGROUND STAGING RAM
SHEET 11
PAC_RAM
FOREGROUND PACKET RAM
SHEET 13
OBJ_ROM
FOREGROUND OBJECT ROM
SHEET 15
PIX_MUX
FOREGROUND PIXEL MULTIPLEXER
SHEET 16
LINE_BUF
FOREGROUND DOUBLE LINE BUFFER
SHEET 17
PIX_OUT
FOREGROUND PIXEL OUTPUT
SHEET 18
DATA
ADDRESS
OE~
FRAM~
WEL~
XFER
PKA(0:8)
SD(0:7)
INC1
INC4
PKACLR~
EOPAC
READY~
LOBJ~
LCG~
LHZ~
LDOFF~
DETEN~
LDET~
PKWE~
RVP(0:3)
PKD(0:7)
GATE~
DHFLIP
S1
S0
HFLIP
RA00
RA01
RD(00:31)
IRA16
VFLIP
IRA15
ND0~
ND1~
PD(00:15)~,PCG(0:7)~,PPR(0:3)
GV0B
GV0A
GV0~
GV0
HCLK~
HCLK
HCLK1
HCLK2
TIME_BASE
GATE
AFLIP
AH0
AH0~
VID0~
VID1~
VID2~
VID3~
FCOL0~
FCOL1~
FPRI
FGCOL
NOTES:
R. A. PLOUSSARD
JULY 7 1987
BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 10 OF 19
REV
27 JUL 87 17:22 /USER/CHM/68KVIDEO/FOREGROUND 1.DRAW

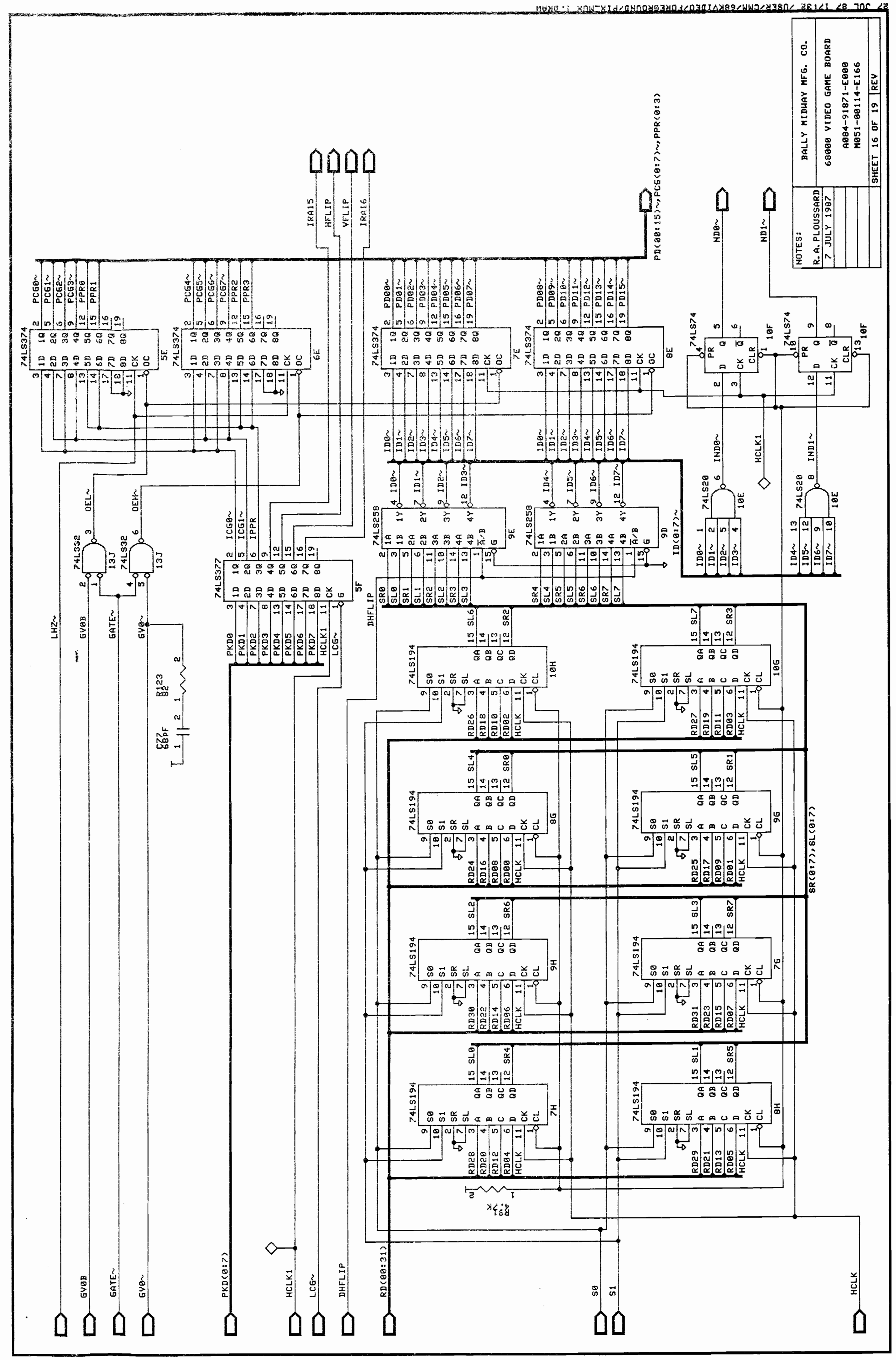

27 JUL 87 17:37 /USER/CHH/68KVIDEO/FOREGROUND/STAGE_RAM_1.DRAW
BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 11 OF 19
REV
NOTES:
R.A.PLOUSSARD
JULY 7 1987

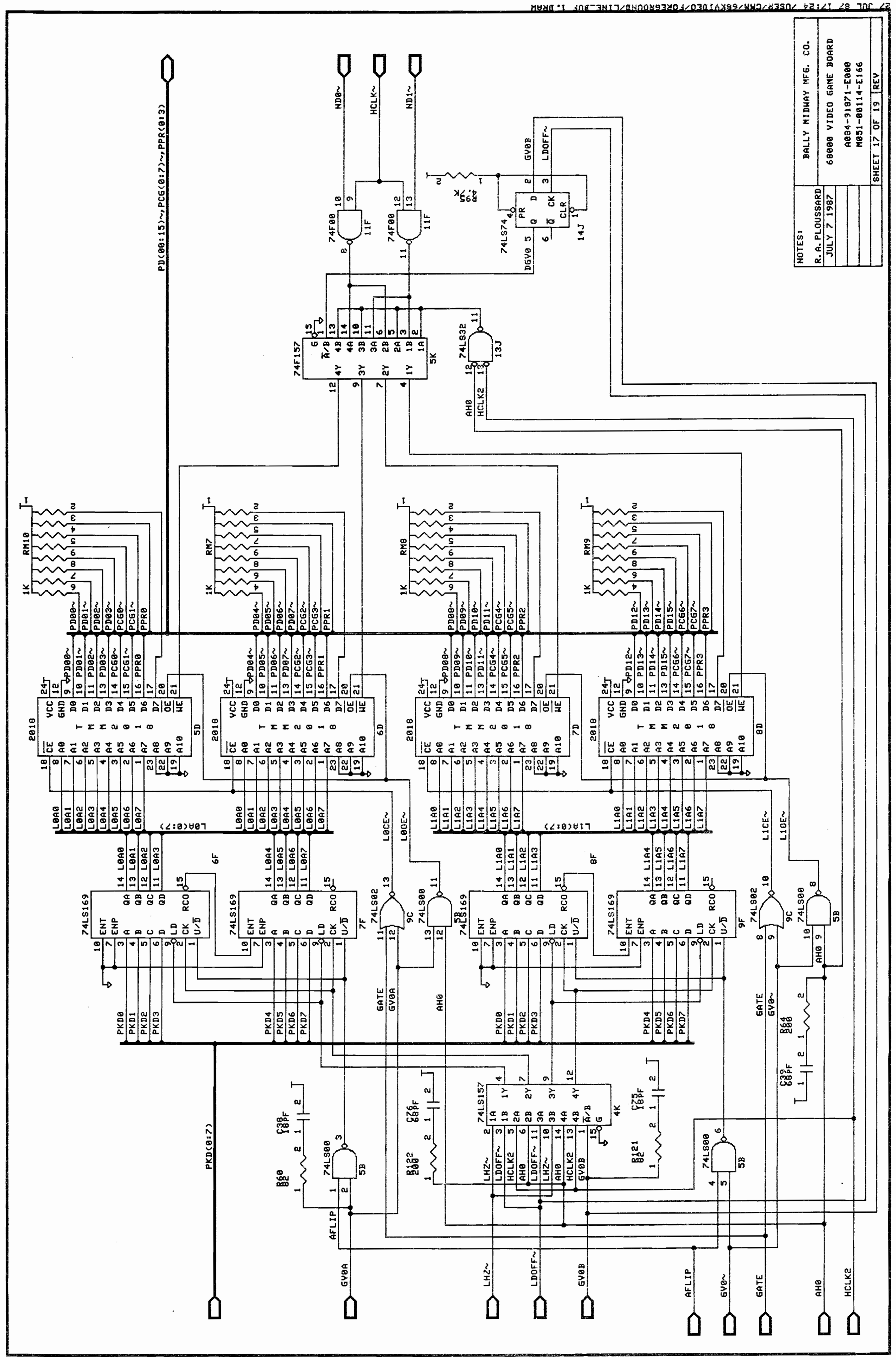

27 JUL 87 17:28 /USER/CHH/68KVIDEO/FOREGROUND/PAC_CNTRL_1.DRAW
BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 12 OF 19
REV
NOTES:
R.A.PLOUSSARD
JULY 7 1987

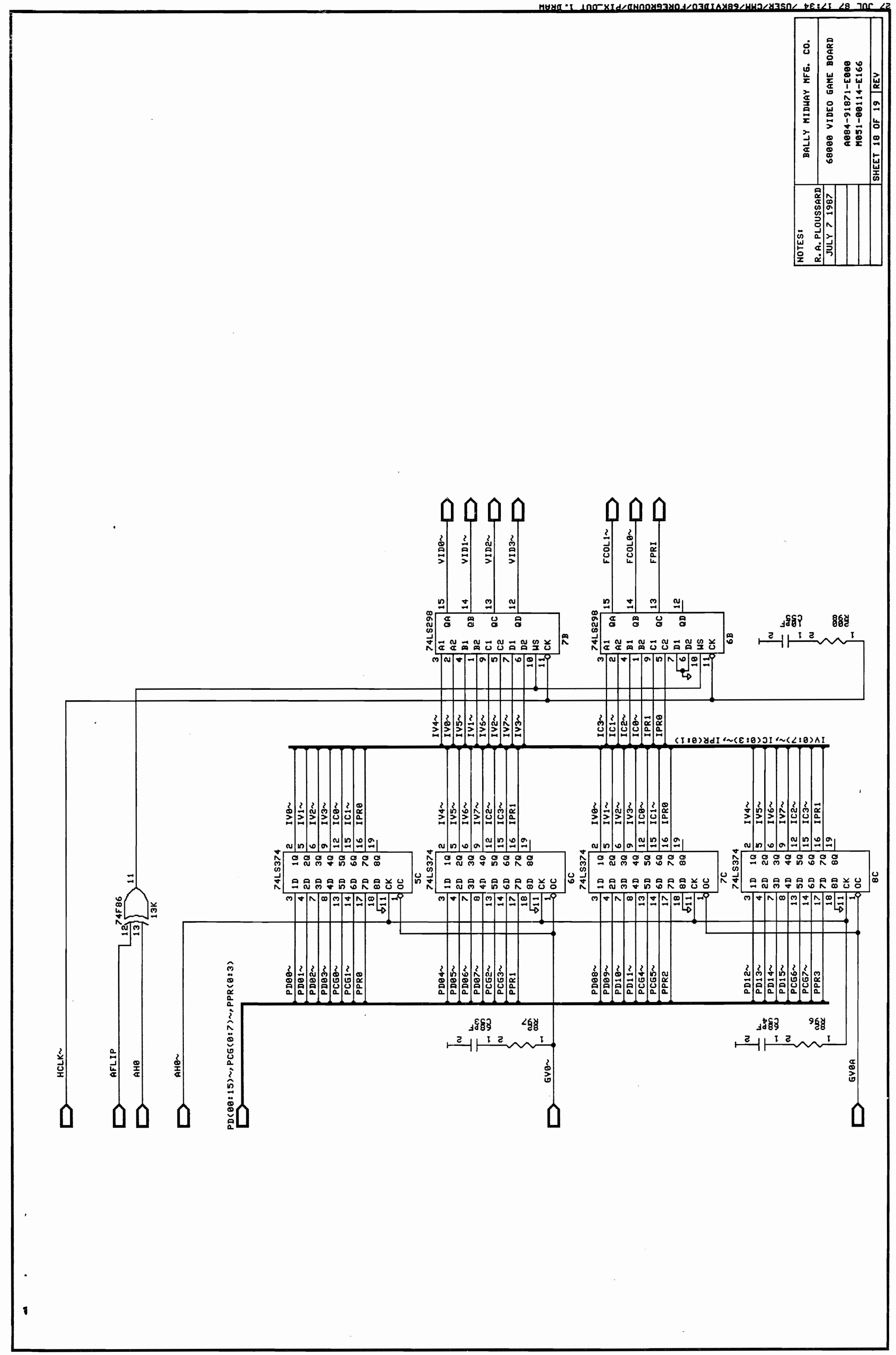

BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 13 OF 19
REV
NOTES:
R.A.PLOUSSARD
JULY 7 1987

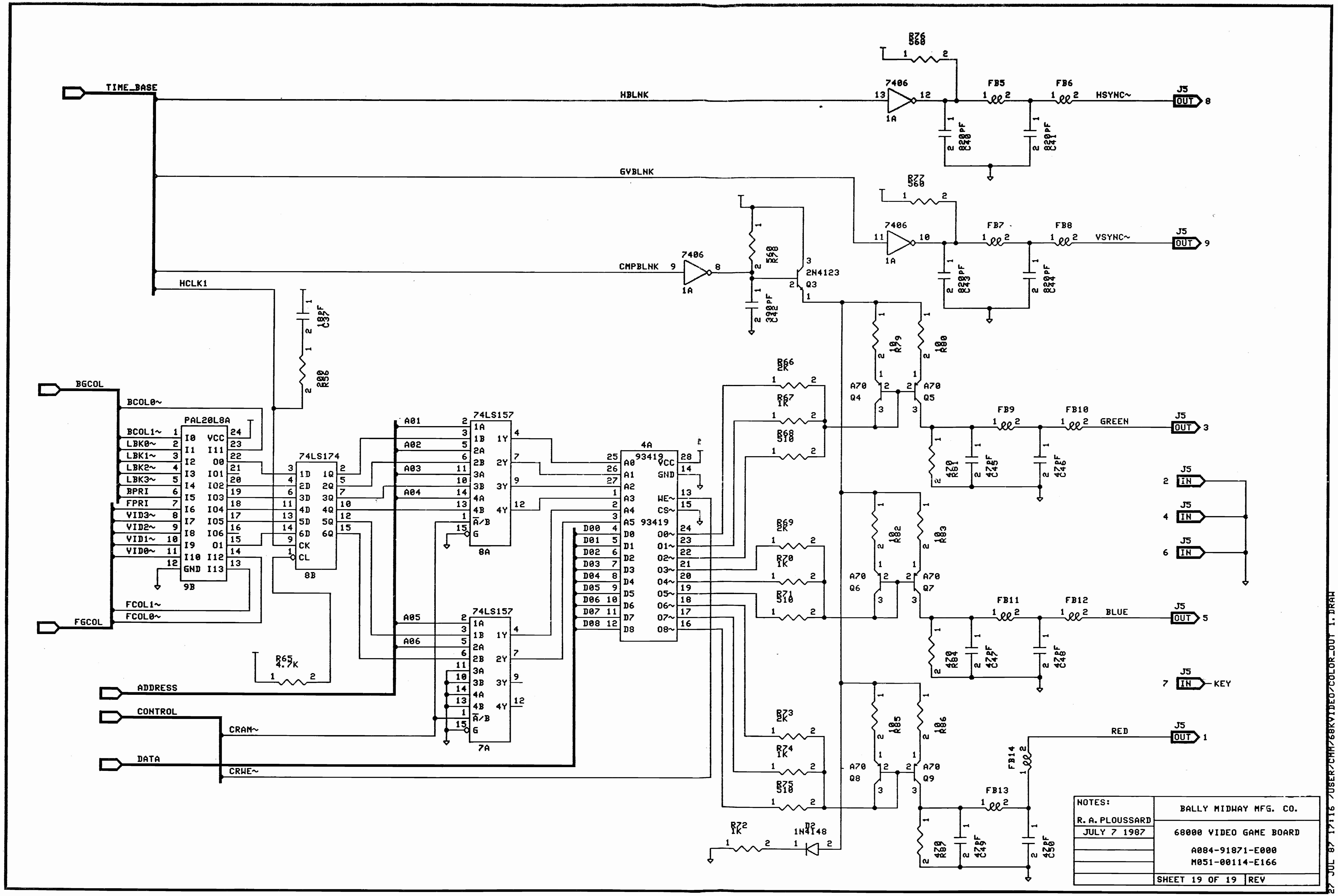

BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 14 OF 19
REV
NOTES:
R.A.PLOUSSARD
JULY 7 1987


NOTES:
R.A.PLOUSSARD
JULY 7 1987
BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 15 OF 19
REV

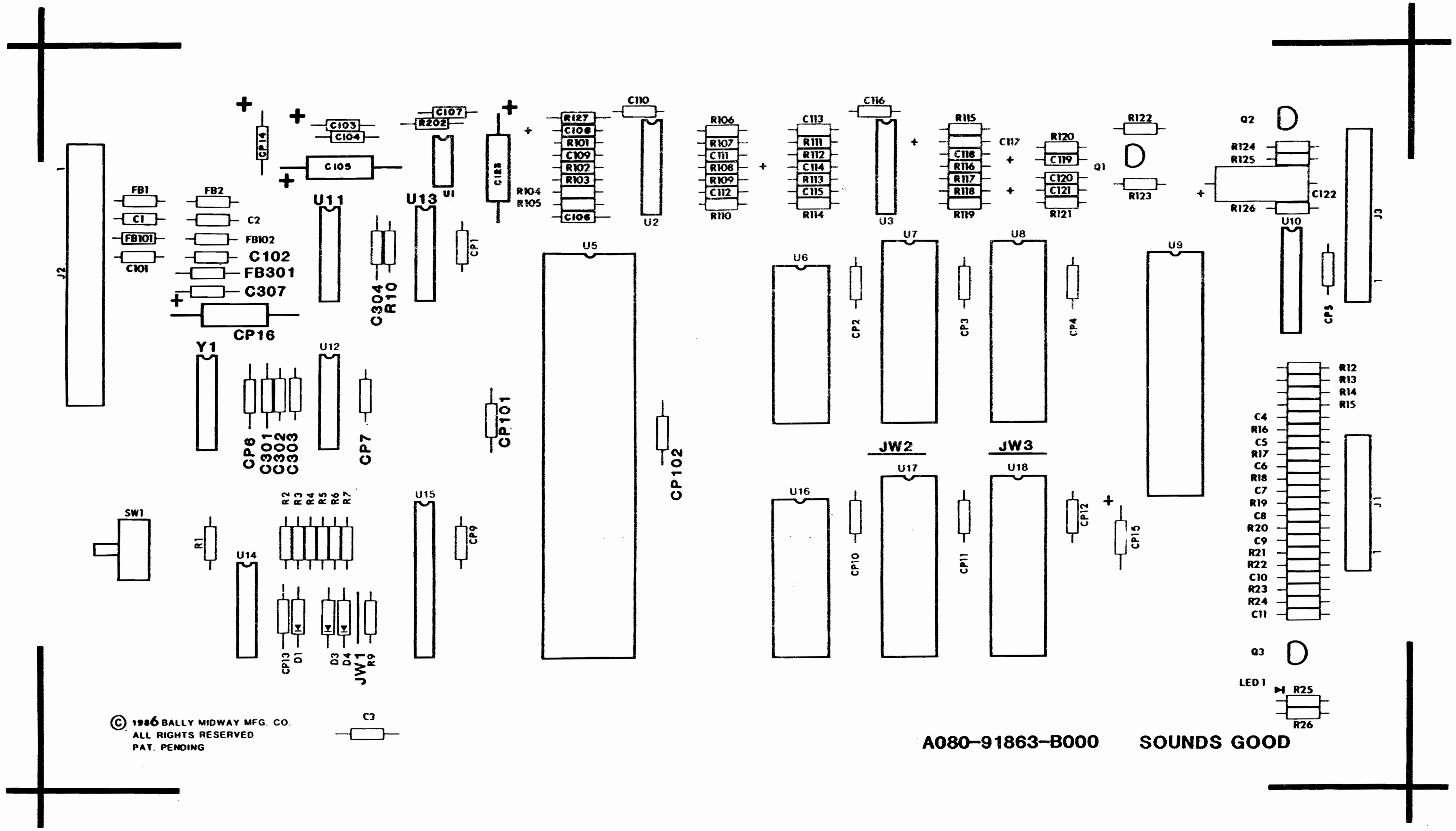

NOTES:
R.A.PLOUSSARD
7 JULY 1987
BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 16 OF 19
REV


27 JUL 87 17:24 /USER/CHR/68KVIDEO/FOREGROUND/LINE_BUF_1.DRAW
BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 17 OF 19
REV
NOTES:
R. A. PLOUSSARD
JULY 7 1987


27 JUL 87 17:34 /USER/CHR/68KVIDEO/FOREGROUND/PIX_OUT_1.DRAW
BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 18 OF 19
REV
NOTES:
R. A. PLOUSSARD
JULY 7 1987



TIME_BASE
HBLNK
GVBLNK
CMPBLNK
HCLK1
BGCOL
BCOL0~
BCOL1~
LBK0~
LBK1~
LBK2~
LBK3~
BPRI
FPRI
VID3~
VID2~
VID1~
VID0~
FCOL1~
FCOL0~
FGCOL
PAL20L8A
9B
74LS174
8B
74LS157
8A
7A
A01
A02
A03
A04
A05
A06
93419
4A
D00
D01
D02
D03
D04
D05
D06
D07
D08
R65 4.7K
ADDRESS
CONTROL
DATA
CRAM~
CRWE~
7406
1A
2N4123
Q3
R76 560
R77 560
R78 560
C40 820PF
C41 820PF
C43 820PF
C44 820PF
C42 390PF
C37 10PF
R56 200
FB5
FB6
FB7
FB8
FB9
FB10
FB11
FB12
FB13
FB14
HSYNC~
VSYNC~
GREEN
BLUE
RED
KEY
J5
OUT
IN
R66 2K
R67 1K
R68 510
R69 2K
R70 1K
R71 510
R73 2K
R74 1K
R75 510
R72 1K
D2 1N4148
A70
Q4
Q5
Q6
Q7
Q8
Q9
R79 10
R80 10
R82 10
R83 10
R85 10
R86 10
R81 470
R84 470
R87 470
C45 47PF
C46 47PF
C47 47PF
C48 47PF
C49 47PF
C50 47PF
NOTES:
R. A. PLOUSSARD
JULY 7 1987
BALLY MIDWAY MFG. CO.
68000 VIDEO GAME BOARD
A084-91871-E000
M051-00114-E166
SHEET 19 OF 19
REV
27 JUL 87 17:16 /USER/CMM/68KVIDEO/COLOR_OUT 1.DRAW



6/13/86	Rel. for Production	CMM

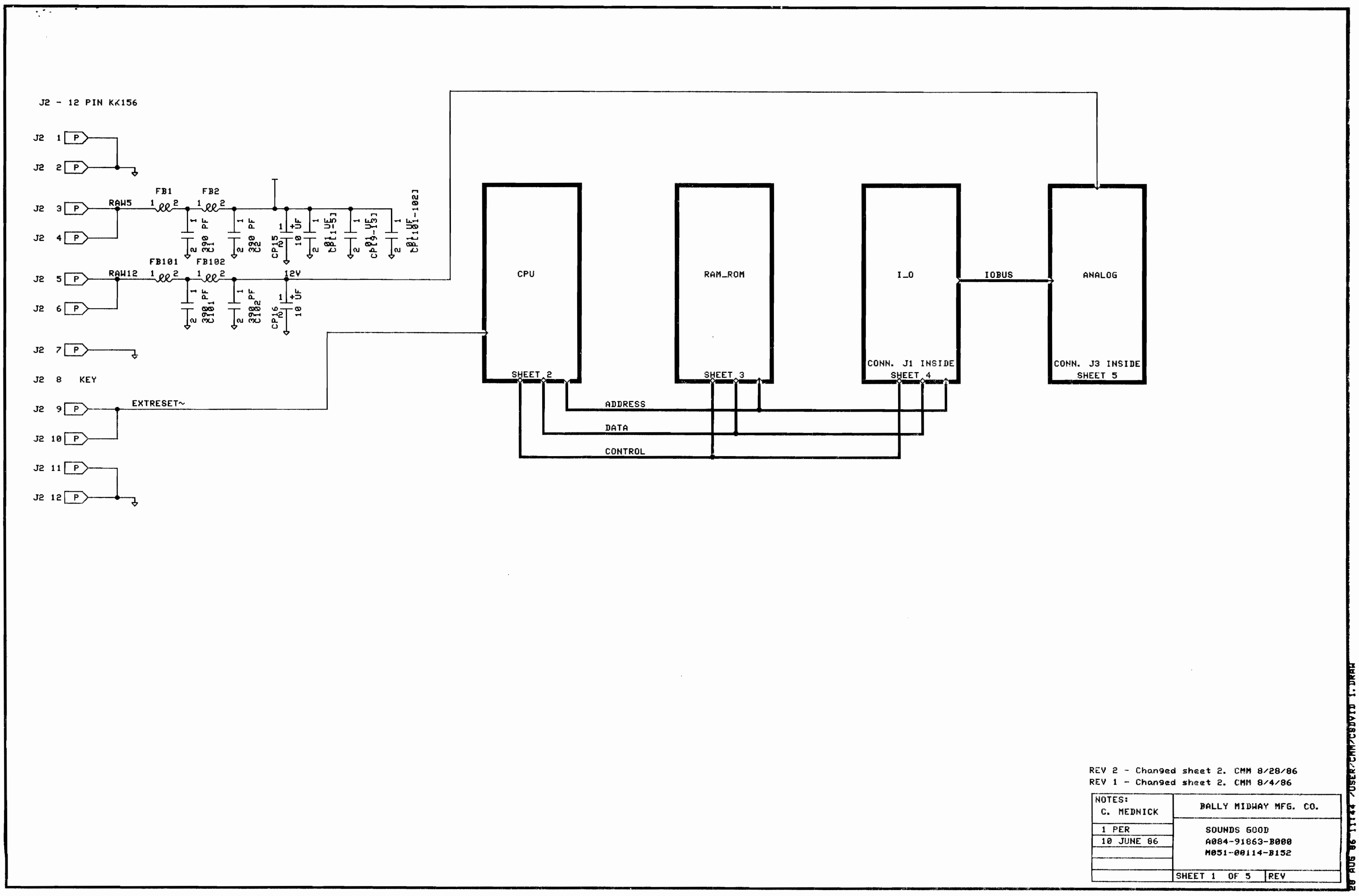
REVISIONS

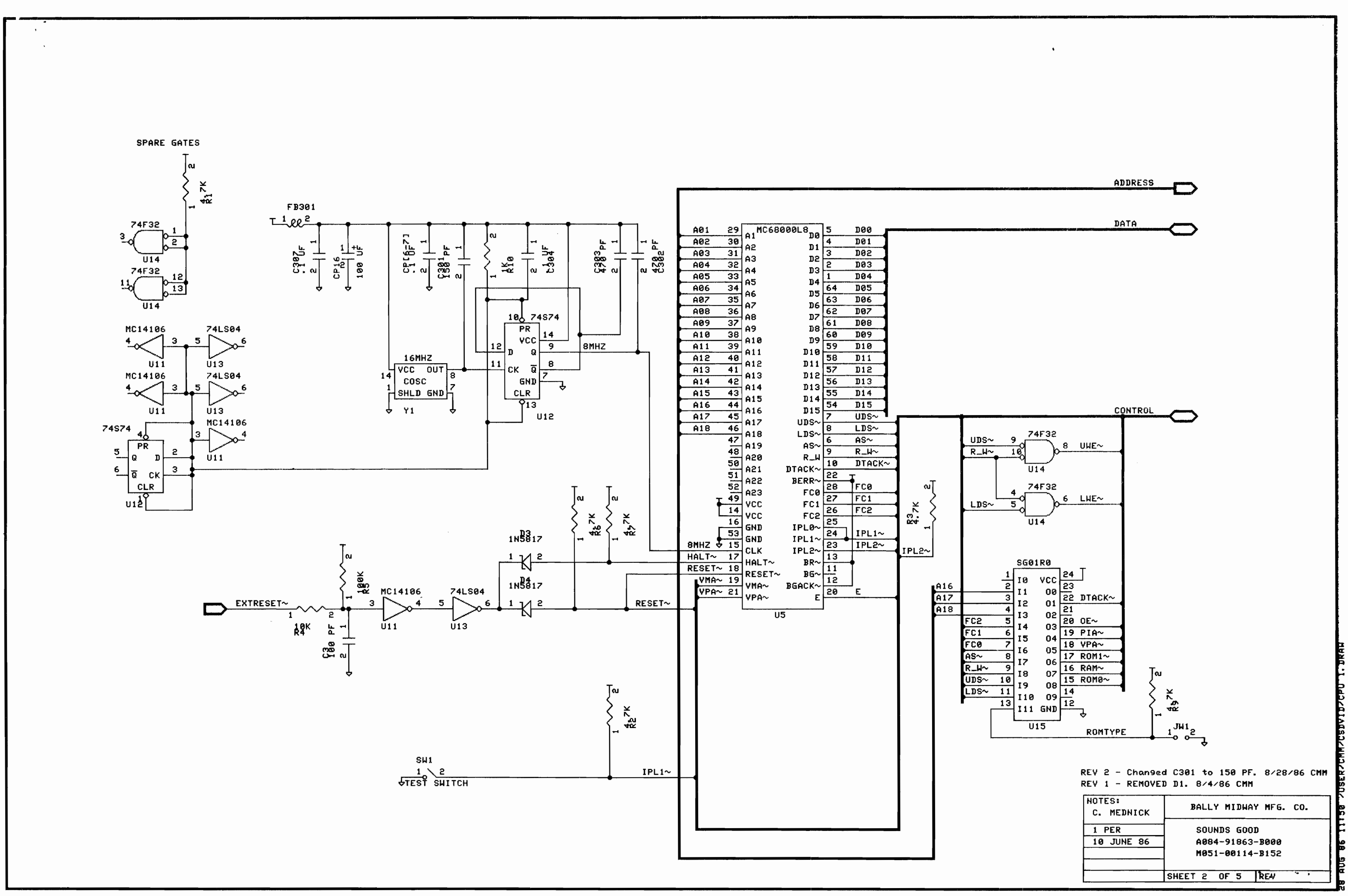
PROJECT ENG: C. MEDNICK		USED ON	Bally / MIDWAY MFG. CO. FRANKLIN PK. ILL.
DO NOT SCALE DWG.	HEAT TREAT / SCALE FULL	NO. REQ'D	
DIM. TOLERANCES UNLESS SPECIFIED CONCENTRICITY T.I.R. .003 FRACTIONAL ± 1/64 DECIMAL ± .005 HOLE DIA. +.002 −.000	DRN. DBS CKD. CMM DATE 6/12/86	MAT'L. FINISH	ASSEMBLY DRAWING SOUNDS GOOD A084-91863-B000
		PART NO.	M051-00114-B150

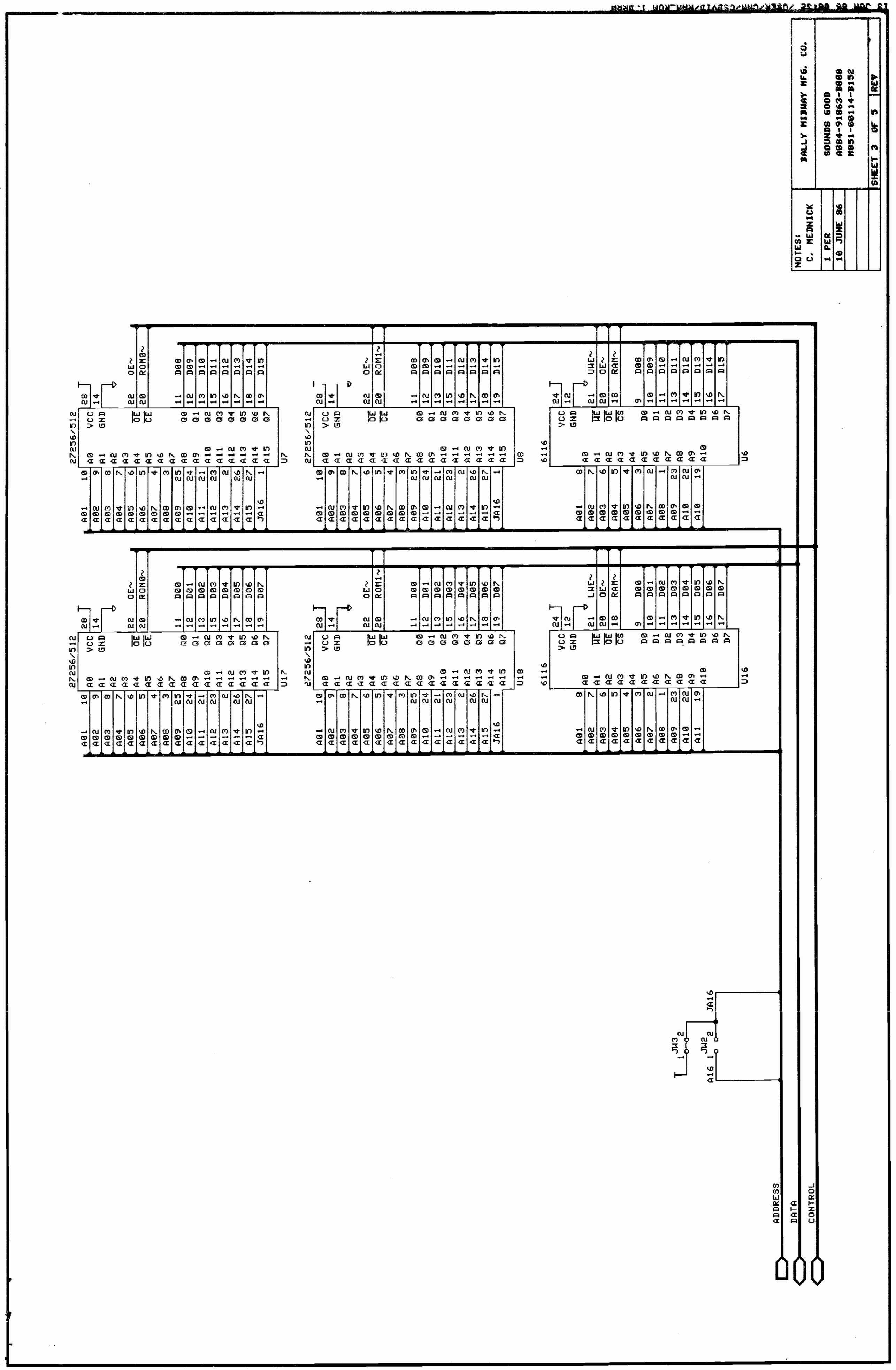
SOUNDS GOOD
A084-91863-B000
M051-00114-B151 Rev. 3

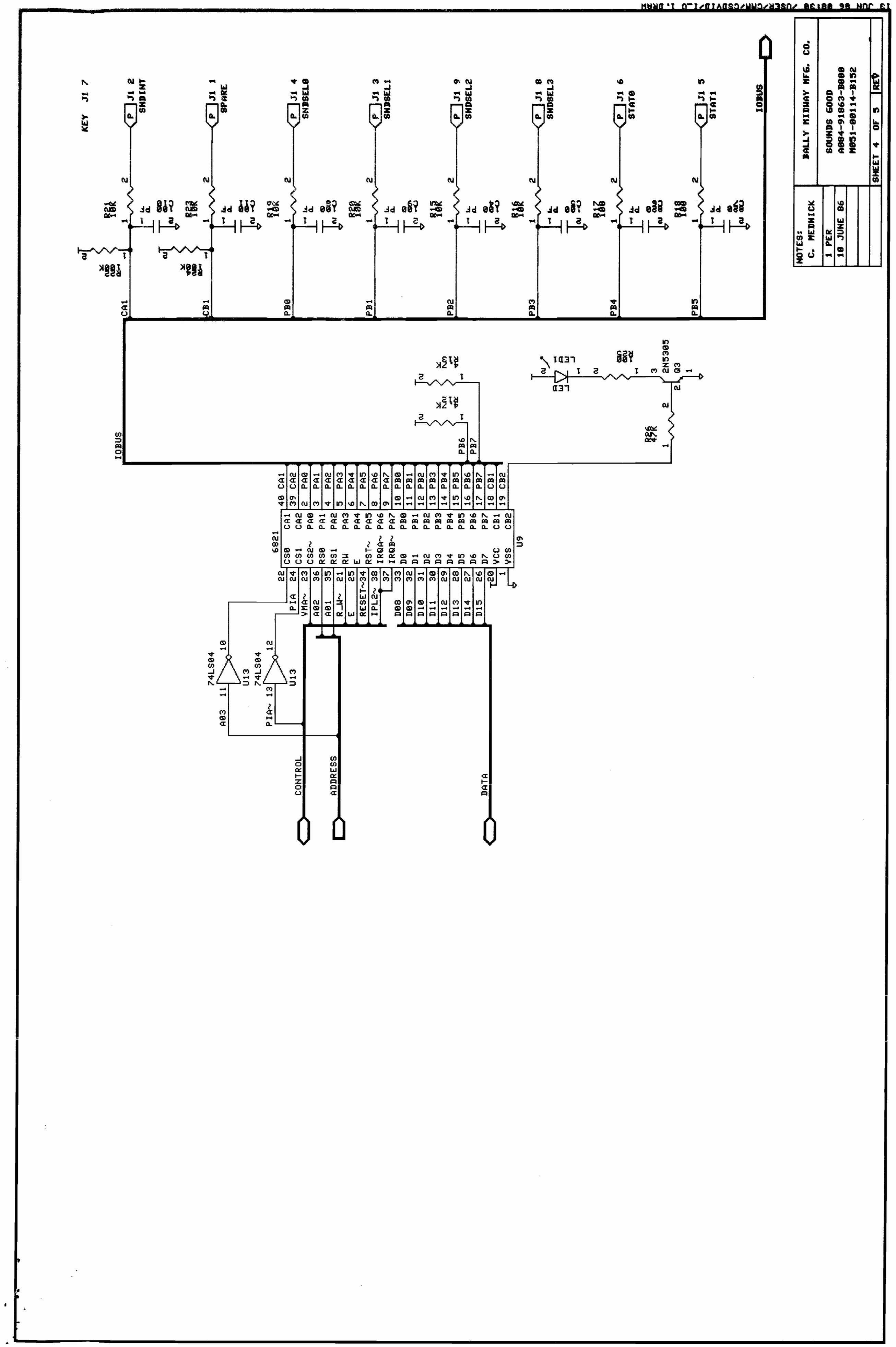
DESCRIPTION	QTY.	DESIGNATION	PART NUMBER
68 PF AX CER 10%	1	C109	0307-00800-0011
100 PF AX CER	7	C3-C5,C8-C11	0304-00800-0001
150 PF AX CER 10%	2	C111,C301	0307-00800-0010
270 PF AX CER 10%	2	C113,C118	0307-00800-0009
390 PF AX CER	4	C1,C2,C101,C102	0986-00800-3000
470 PF AX CER 10%	3	C112,C302,C303	0307-00800-0008
680 PF AX CER	1	C106	0358-00800-0002
820 PF AX CER	2	C6,C7	0304-00800-0002
5600 PF AX CER 10%	1	C115	0307-00800-0007
.01 MF AX CER	17	C104,C107,C110 C116,C120,CP1-CP7, CP9-CP13	0986-00800-2200
0.1 UF AX CER	4	C304,C307,CP101,CP102	0986-00800-0200
1 MF RD TANT	4	C103,C108,C114,C117	0307-00800-0004
10 MF AX TANT	2	CP14,CP15	0986-00800-0700
10 MF RD TANT	2	C119,C121	0307-00800-0005
47 MF AX ELECT	2	C105,C122	0307-00800-0003
100 MF AX ELECT	2	CP16,C123	0307-00800-0006
100 OHM 1/4W CRBN	5	R17,R18,R25,R103, R202	100E-00005-0033
180 OHM 1/4W CRBN	1	R125	100E-00005-0039
360 OHM 1/4W CRBN	2	R123,R124	100E-00005-0048
1K OHM 1/4W CRBN	2	R10,R121	100E-00005-0061
2.7K OHM 1/4W CRBN	2	R122,R126	100E-00005-0071
3.3K OHM 1/4W CRBN	1	R106	100E-00005-0074
4.7K OHM 1/4W CRBN	9	R1-R3,R6-R7,R9 R12-R14	100E-00005-0079
10K OHM 1/4W CRBN	7	R4,R15,R16,R19-R21, R23	100E-00005-0088
12K OHM 1/4W CRBN	1	R101	100E-00005-0090
18K OHM 1/4W CRBN	1	R117	100E-00005-0093
24K OHM 1/4W CRBN	2	R105,R107	100E-00005-0097
33K OHM 1/4W CRBN	2	R113,R116	100E-00005-0100
47K OHM 1/4W CRBN	2	R26,R120	100E-00005-0104
82K OHM 1/4W CRBN	1	R109	100E-00005-0112
100K OHM 1/4W CRBN	4	R5,R22,R24,R118	100E-00005-0115
120K OHM 1/4W CRBN	2	R111,R112	100E-00005-0118
150K OHM 1/4W CRBN	2	R108,R115	100E-00005-0120
160K OHM 1/4W CRBN	1	R102	100E-00005-0121
330K OHM 1/4W CRBN	2	R104,R114	100E-00005-0128
510K OHM 1/4W CRBN	2	R110,R119	100E-00005-0133
560K OHM 1/4W CRBN	1	R127	100E-00005-0134
1N5817	2	D3-D4	103E-00003-0009
2N5305	3	Q1-Q3	0360-00802-0012
74LS04	1	U13	0304-00803-0060
74F32	1	U14	0304-00803-0059

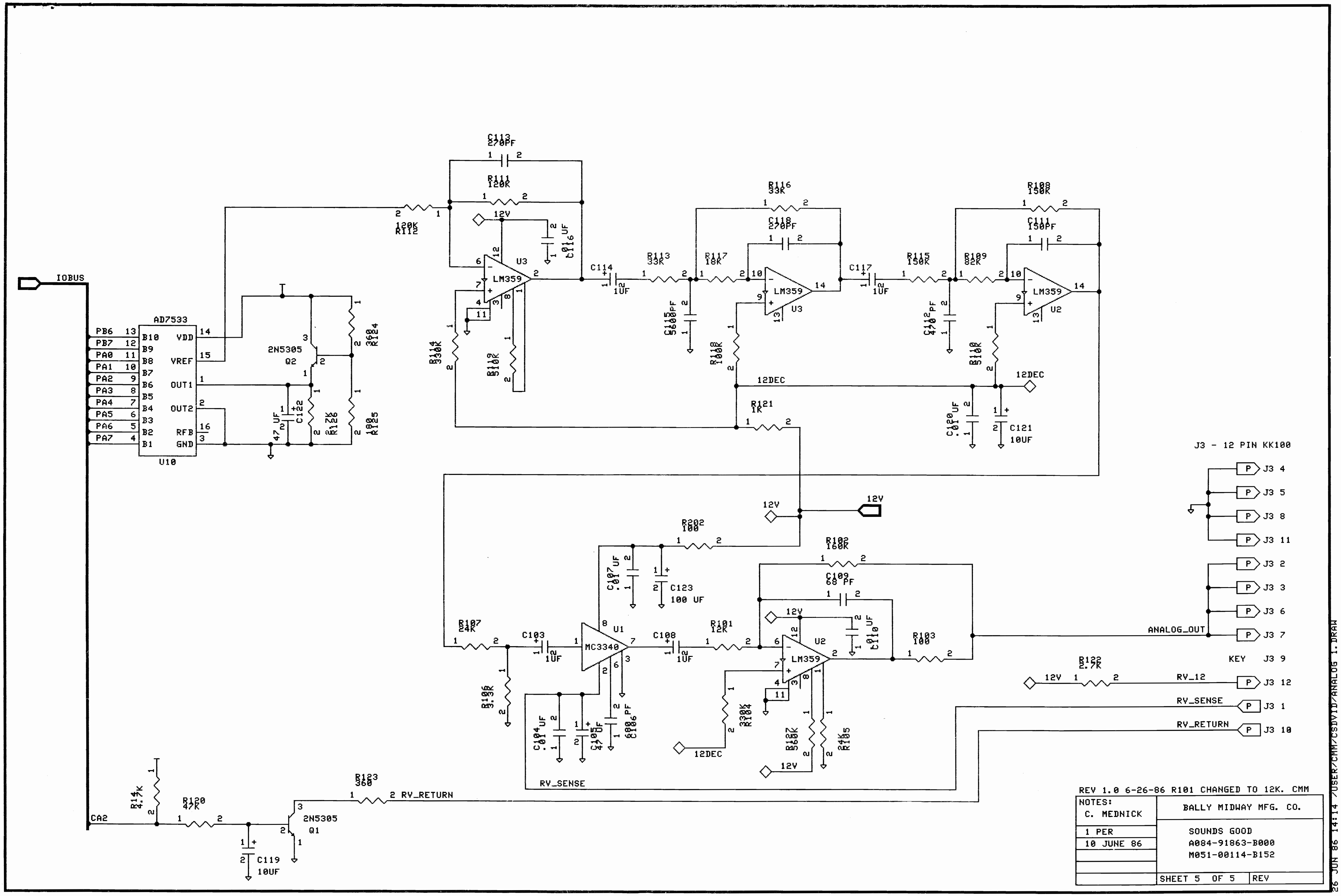
DESCRIPTION	QTY.	DESIGNATION	PART NUMBER
74S74	1	U12	0304-00803-0061
14584/40106	1	U11	0304-00803-0056
6821 PIA	1	U9	0304-00803-0054
68000G8 CPU	1	U5	0304-00803-0051
AD7533JN DAC	1	U10	0304-00803-0055
SG01R0 PAL	1	U15	0E36-00803-0009
LM359	2	U2,U3	0304-00803-0053
MC3340	1	U1	0358-00803-0002
RAM 2KX8	2	U6,U16	0304-00803-0057
ROM/EPROM	1	U7	
ROM/EPROM	1	U8	SEE ROM/EPROM
ROM/EPROM	1	U17	CHART
ROM/EPROM	1	U18	
FERRITE BEAD	5	FB1,FB2,FB101,FB102, FB301	0316-00804-0002
16 PIN IC SOCKET	1	ICS U10	110E-00001-0003
24 PIN IC SOCKET .300	1	ICS U15	110E-00001-0009
24 PIN IC SOCKET .600	2	ICS U6,U16	110E-00001-0007
28 PIN IC SOCKET	4	ICS U7,U8,U17,U18	110E-00001-0010
40 PIN IC SOCKET	1	ICS U9	110E-00001-0011
64 PIN IC SOCKET	1	ICS U5	110E-00001-0016
AUTO INSERT PIN TIN .025 SQ	8	J1	0304-00804-0009
AUTO INSERT PIN TIN .025 SQ	11	J3	0304-00804-0009
AUTO INSERT PIN TIN .045 SQ	11	J2	0304-00804-0010
ZERO OHM RES	3	JW1-JW3	117E-00001-0003
GREEN LED	1	LED 1	119E-00001-0001
SWITCH PC MTG	1	SW1	0986-00804-3100
16 MHZ XSTAL OSC	1	Y1	0304-00804-0008
PC BOARD	1		A080-91671-G000


J2 - 12 PIN K<156
RAW5
RAW12
FB1
FB2
FB101
FB102
12V
EXTRESET~
KEY
CPU
SHEET 2
RAM_ROM
SHEET 3
I_O
CONN. J1 INSIDE
SHEET 4
IOBUS
ANALOG
CONN. J3 INSIDE
SHEET 5
ADDRESS
DATA
CONTROL
REV 2 - Changed sheet 2. CMM 8/28/86
REV 1 - Changed sheet 2. CMM 8/4/86
NOTES:
C. MEDNICK
1 PER
10 JUNE 86
BALLY MIDWAY MFG. CO.
SOUNDS GOOD
A084-91863-B000
M051-00114-B152
SHEET 1 OF 5
REV


SPARE GATES
74F32
U14
MC14106
U11
74LS04
U13
74S74
U12
FB301
16MHZ
COSC
Y1
8MHZ
MC68000L8
U5
ADDRESS
DATA
CONTROL
SG01R0
U15
ROMTYPE
JW1
EXTRESET~
RESET~
IPL1~
IPL2~
SW1
TEST SWITCH
1N5817
REV 2 - Changed C301 to 150 PF. 8/28/86 CMM
REV 1 - REMOVED D1. 8/4/86 CMM
NOTES:
C. MEDNICK
1 PER
10 JUNE 86
BALLY MIDWAY MFG. CO.
SOUNDS GOOD
A084-91863-B000
M051-00114-B152
SHEET 2 OF 5
REV


BALLY MIDWAY MFG. CO.
SOUNDS GOOD
A084-91863-D000
M051-00114-D152
SHEET 3 OF 5
REV
NOTES:
C. MEDNICK
1 PER
10 JUNE 86
ADDRESS
DATA
CONTROL


BALLY MIDWAY MFG. CO.
SOUNDS GOOD
A084-91863-D000
M051-00114-D152
SHEET 4 OF 5
REV
NOTES:
C. MEDNICK
1 PER
10 JUNE 86
IOBUS
CONTROL
ADDRESS
DATA


IOBUS
AD7533
U10
PB6 13 B10
PB7 12 B9
PA0 11 B8
PA1 10 B7
PA2 9 B6
PA3 8 B5
PA4 7 B4
PA5 6 B3
PA6 5 B2
PA7 4 B1
VDD 14
VREF 15
OUT1 1
OUT2 2
RFB 16
GND 3
2N5305
Q2
R124 360
R125 100
R126 8.2K
C122 47 UF
C113 270PF
R111 120K
R112 120K
12V
C116 .01 UF
LM359
U3
R114 330K
R119 10K
C114 1UF
R113 33K
C115 5600PF
R117 18K
R116 33K
C118 270PF
R118 100K
12DEC
R121 1K
C117 1UF
R115 150K
C112 470 PF
R109 82K
R108 150K
C111 150PF
LM359
U2
R110 51K
C120 .01 UF
C121 10UF
J3 - 12 PIN KK100
J3 4
J3 5
J3 8
J3 11
J3 2
J3 3
J3 6
J3 7
ANALOG_OUT
KEY J3 9
R122 2.7K
RV_12
J3 12
RV_SENSE
J3 1
RV_RETURN
J3 10
R202 100
C107 .01 UF
C123 100 UF
R102 160K
C109 68 PF
R107 24K
C103 1UF
MC3340
U1
C108 1UF
R101 12K
C110 .01 UF
R103 100
R106 3.3K
C104 .01 UF
C105 47 UF
C106 680 PF
R104 330K
R127 560K
R105 24K
12DEC
12V
RV_SENSE
R14 4.7K
R120 47K
CA2
C119 10UF
2N5305
Q1
R123 360
RV_RETURN
REV 1.0 6-26-86 R101 CHANGED TO 12K. CMM
NOTES:
C. MEDNICK
BALLY MIDWAY MFG. CO.
1 PER
10 JUNE 86
SOUNDS GOOD
A084-91863-B000
M051-00114-B152
SHEET 5 OF 5
REV
26 JUN 86 14:14 /USER/CMM/CSDVID/ANALOG 1.DRAW

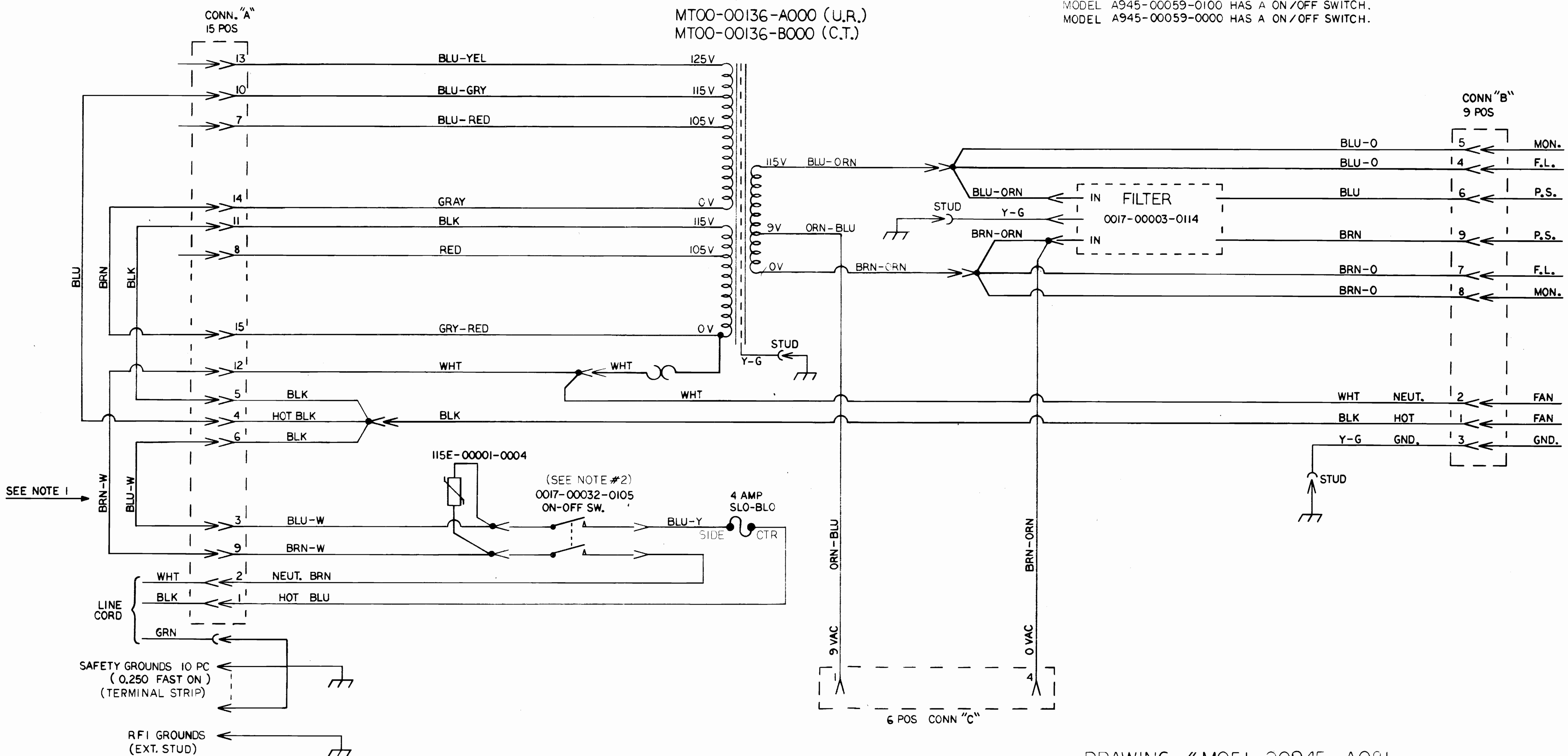
A945-00059-0000/0100/0200

UNI PWR SUPPLY CHASSIS ASS'Y # 125 SWUR + 125 SWCT

	105	115	210	220	230	240
BLK	5-8	5-11	8-14	11-14	11-14	11-14
BRN	14-15	14-15	—	—	—	—
BLU	4-7	4-10	4-7	4-7	4-10	4-13

NOTES:
1. JUMPERS ON CONN "A" 3-6 AND 9-12 CAN BE REPLACED WITH A SAFETY SW. AND/OR AUX. ON OFF SW.
2. MODEL A945-00059-0200 HAS A TERMINAL STRIP.
MODEL A945-00059-0100 HAS A ON/OFF SWITCH.
MODEL A945-00059-0000 HAS A ON/OFF SWITCH.

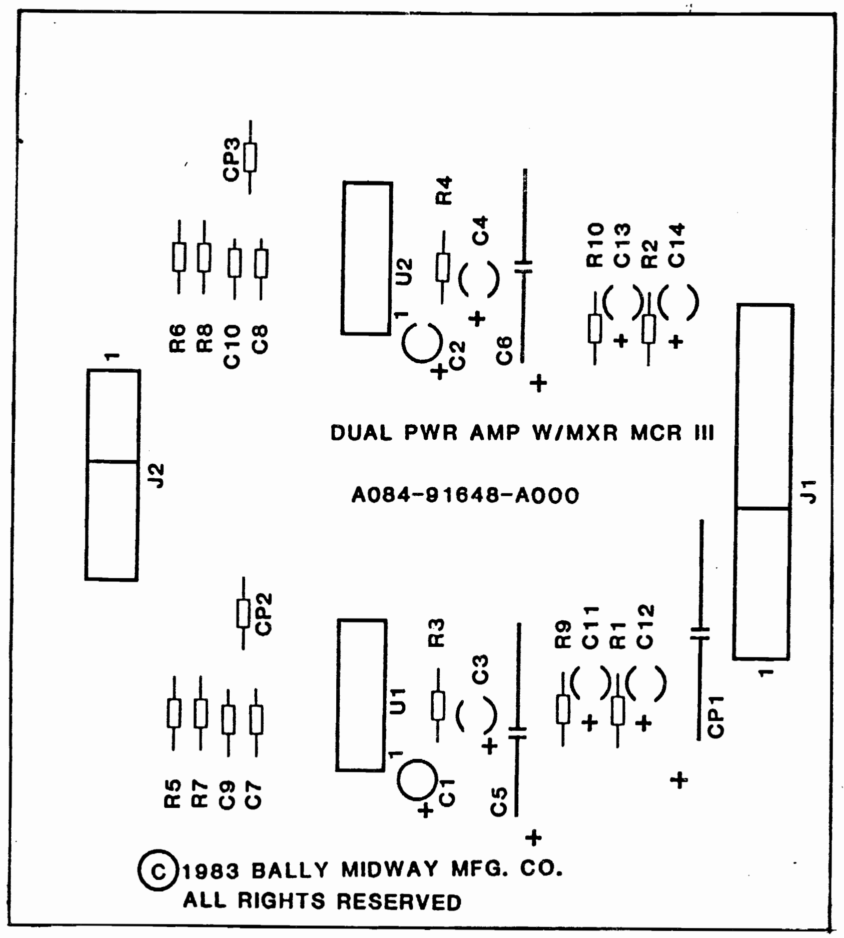
TRANSFORMER
MT00-00136-A000 (U.R.)
MT00-00136-B000 (C.T.)



DRAWING # M051-00945-A081

REL FOR PRODUCTION: 4/26/85

DUAL POWER AMP W/MXR
A084-91648-A000
M051-00304-A025 REV. 1



DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
.1 MF 50V AX CR.	6	C7-C10,CP2,CP3	0986-00800-1100
1 MF 25V RD TANT	4	C11-C14	0B75-00803-0002
4.7 MF 25V RD TANT.	2	C1,C2	0986-00800-3100
22 MF 6V RD TANT.	2	C3,C4	0986-00800-1600
220 MF 25V AX ELECT.	1	CP1	0986-00800-3200
470 MF 6V AX ELECT.	2	C5,C6	0986-00800-1700
1 OHM 1/2W 5%	4	R5-R8	100E-00006-0002
27 OHM 1/4W 5%	2	R3,R4	100E-00005-0018
2.7K 1/4W 5%	4	R1,R2,R9,R10	100E-00005-0071
# MB3730	2	U1,U2	0066-188XX-XX4X
.045 SQ. PIN	5	J2	0304-00804-0010
.045 SQ. PIN	10	J1	0304-00804-0010
HEATSINK ASSY.	2	HSU1,HSU2	A986-00010-0000
DUAL PWR AMP W/MXR	1		A080-91648-A000

NOTE: THIS PART IS ACTUALLY PART OF THE HEATSINK ASSY.

REVISIONS

8/7/87 Rev 1 - Removed XREF/DESIG LIST. - Changed to 'A' size Dwg cmm

PROJECT ENG:

USED ON Video

NO. REQ'D /

Bally / MIDWAY MFG. CO.
FRANKLIN PK. ILL.

DO NOT SCALE DWG.

HEAT TREAT

SCALE —

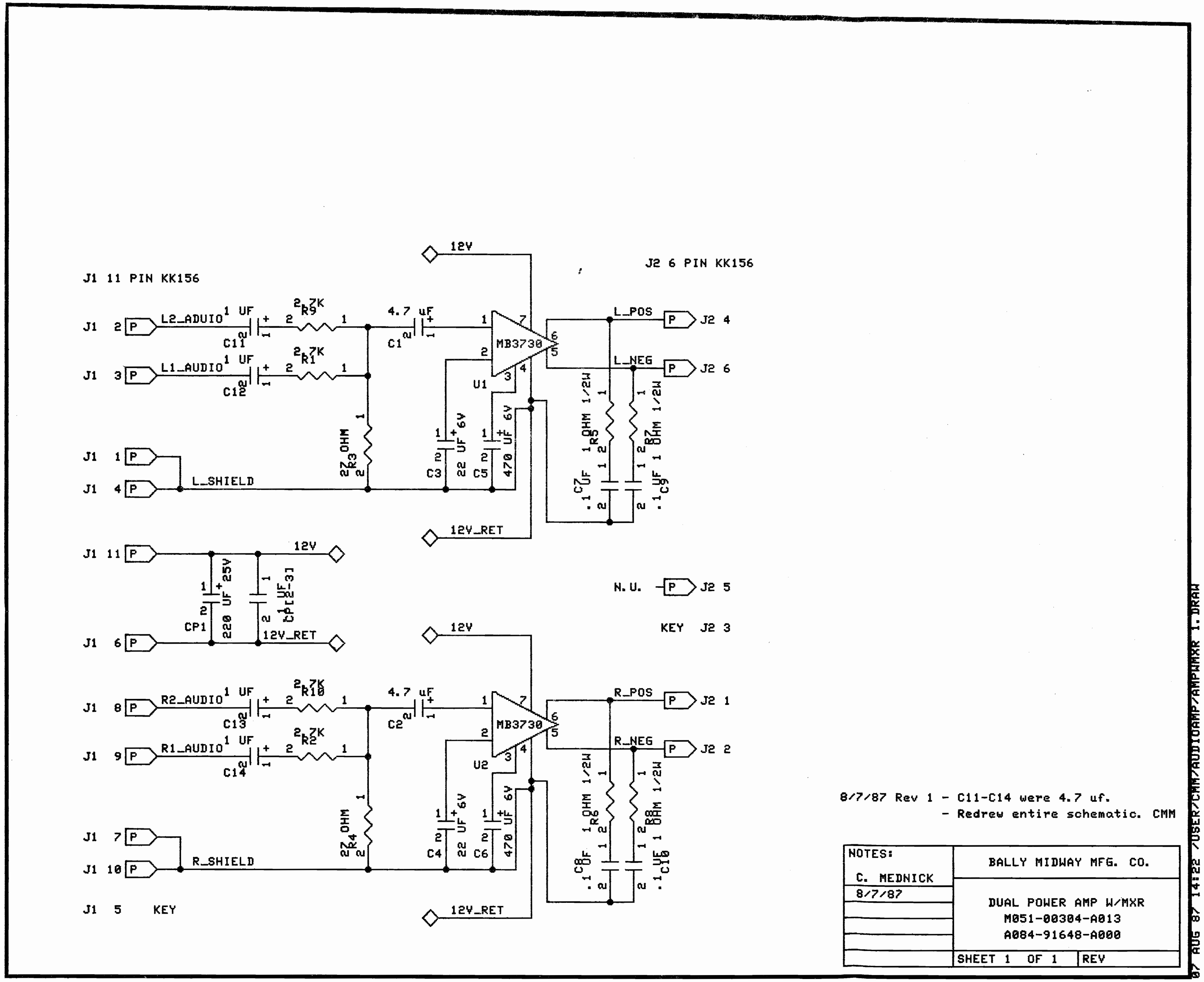
DIM. TOLERANCES UNLESS SPECIFIED
CONCENTRICITY T.I.R. .003
FRACTIONAL ±1/64
DECIMAL ±.005
HOLE DIA +.002 -.000

DRN. cmm
CKD.
DATE 08/07/87

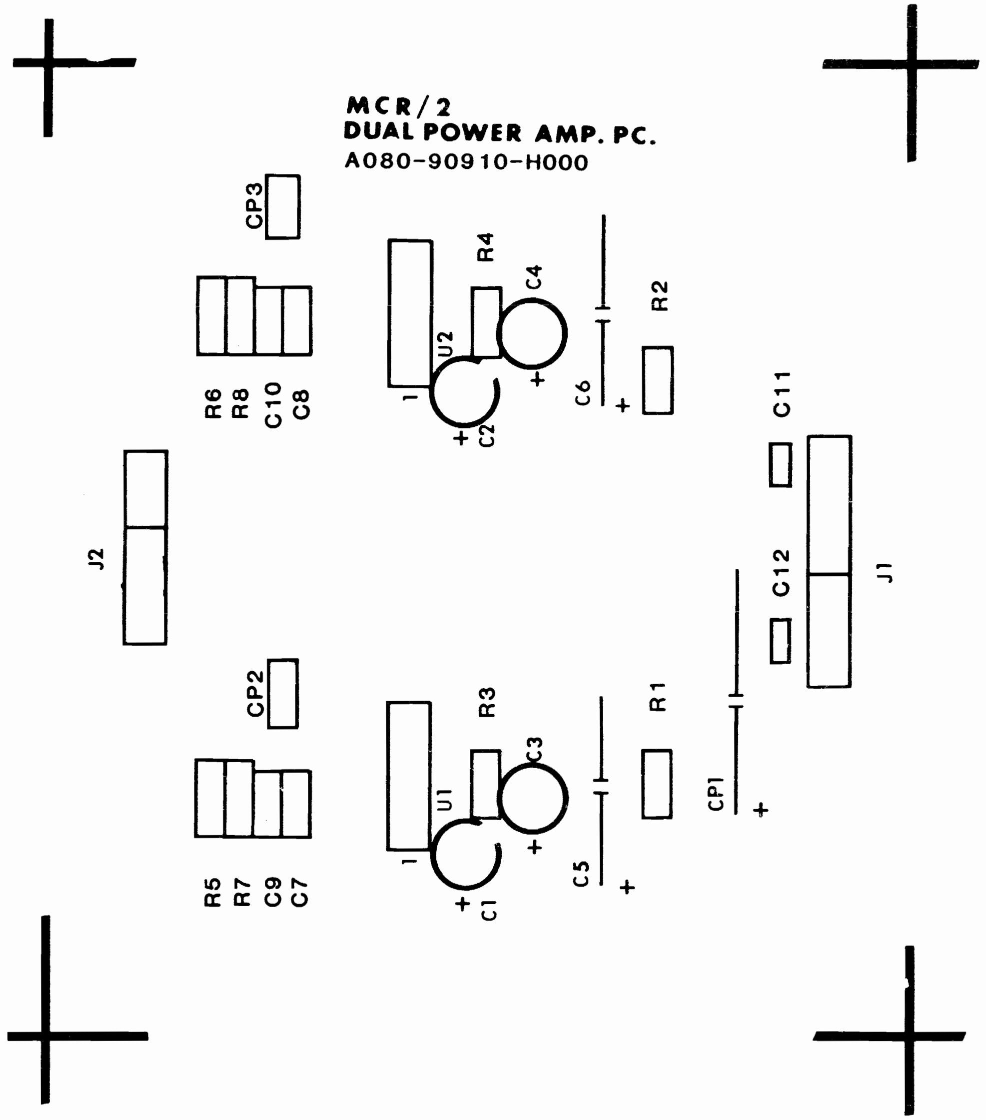
MAT'L.
FINISH

ASSEMBLY DWG.
DUAL POWER AMP W/MXR
A084-91648-A000

PART NO.
M051-00304-A012


J1 11 PIN KK156
J2 6 PIN KK156
L2_ADUIO
L1_AUDIO
L_SHIELD
R2_AUDIO
R1_AUDIO
R_SHIELD
MB3730
U1
U2
12V
12V_RET
L_POS
L_NEG
R_POS
R_NEG
N. U.
KEY J2 3
J1 5 KEY
1 UF
2.7K
4.7 uF
27 OHM
22 UF 6V
470 UF 6V
1 OHM 1/2W
.1 UF
220 UF 25V
8/7/87 Rev 1 - C11-C14 were 4.7 uf.
- Redrew entire schematic. CMM
NOTES:
C. MEDNICK
8/7/87
BALLY MIDWAY MFG. CO.
DUAL POWER AMP W/MXR
M051-00304-A013
A084-91648-A000
SHEET 1 OF 1
REV

DUAL POWER AMP
A084-90910-H000
M051-00986-H017 (PAGE 2 OF 2) REV. 3



CROSS REFERENCE LIST

DESCRIPTION	QTY.	DESIGNATION NO.	PART NOS.
.002 MF RD CER.	2	C11,C12	0360-00800-0012
.1 MF 50V AX. CER.	6	C7-C10,CP2,CP3	0986-00800-1100
1 MF RD TANT	2	C1,C2	0B75-00800-0002
22 MF 6V RD TANT.	2	C3,C4	0986-00800-1600
220 MF 25V AX ELECT.	1	CP1	0986-00800-3200
470 MF 6V AX ELECT.	2	C5,C6	0986-00800-1700
1 OHM 1/2W 5%	4	R5-R8	100E-00006-0002
27 OHM 1/4W 5%	2	R3,R4	100E-00005-0018
2.7K 1/4W 5%	2	R1,R2	100E-00005-0071
* MB3730	2	U1,U2	0066-188XX-XX4X
TIN .045 SQ. PINS	12	J1,J2	0304-00804-0010
HEATSINK ASSY.	2	HSA1,HSA2	A986-00010-0000
PC BOARD	1		A080-90910-H000

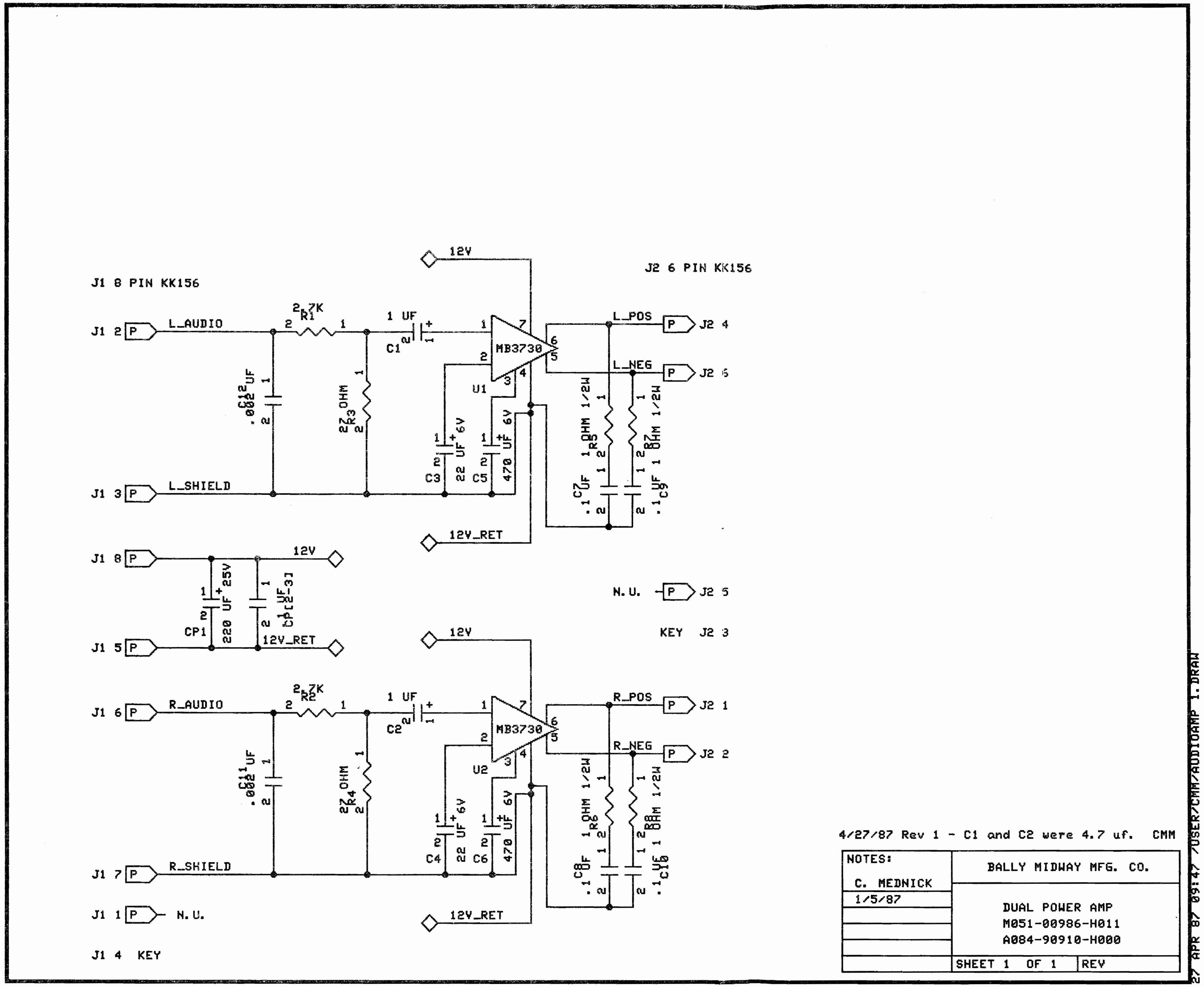
* NOTE: THIS PART IS ACTUALLY PART OF THE HEATSINK ASSY.

RELEASED 5, JANUARY, 87. CMM
10 FEB. 87 - REV. 1 - C11 & C12 WERE AXIAL. CMM
27 APRIL 87 - REV. 2 - C1 & C2 WERE 4.7UF TANT. CMM
1 SEPT. 87 - REV. 3 - C1,C2 WERE PART #0B75-00803-0002

1/5/87	Released For Production	CMM

REVISIONS

PROJECT ENG: C. MEDNICK		USED ON	Bally / MIDWAY MFG. CO. FRANKLIN PK. ILL.
DO NOT SCALE DWG.	HEAT TREAT	SCALE FULL	NO. REQ'D 1 PER
DIM. TOLERANCES UNLESS SPECIFIED CONCENTRICITY T.I.R. .003 FRACTIONAL ± 1/64 DECIMAL ± .005 HOLE DIA. +.002 -.000	DRN. DBS 11/18/86 CKD. CMM 12/16/86 DATE / /	MAT'L. FINISH	ASSEMBLY DRAWING DUAL POWER AMP A084-90910-H000
		PART NO.	M051-00986-H010


J1 8 PIN KK156
J2 6 PIN KK156
J1 2
L_AUDIO
2.7K R1
1 UF
C1
MB3730
U1
12V
L_POS
J2 4
L_NEG
J2 6
C12 .002 UF
27 OHM R3
C3 22 UF 6V
C5 470 UF 6V
1 OHM 1/2W R5
1 OHM 1/2W R7
C7 .1 UF
C9 .1 UF
J1 3
L_SHIELD
12V_RET
J1 8
12V
CP1 220 UF 25V
CP[2-3] .1 UF
J1 5
12V_RET
N.U.
J2 5
KEY J2 3
J1 6
R_AUDIO
2.7K R2
1 UF
C2
MB3730
U2
R_POS
J2 1
R_NEG
J2 2
C11 .002 UF
27 OHM R4
C4 22 UF 6V
C6 470 UF 6V
1 OHM 1/2W R6
1 OHM 1/2W R8
C8 .1 UF
C10 .1 UF
J1 7
R_SHIELD
J1 1
N.U.
J1 4 KEY
4/27/87 Rev 1 - C1 and C2 were 4.7 uf. CMM
NOTES:
C. MEDNICK
1/5/87
BALLY MIDWAY MFG. CO.
DUAL POWER AMP
M051-00986-H011
A084-90910-H000
SHEET 1 OF 1
REV
27 APR 87 09:47 /USER/CMM/AUDIOAMP 1.DRAW

BALLY/MIDWAY'S XENOPHOBE (3 PLYR)
U.R. #0E85
ROM/EPROM PART NUMBERS

UNPROGRAMMED 68000 VIDEO BOARD A084-91871-E000 **or** A084-91871-D000
PROGRAMMED 68000 VIDEO BOARD A084-91871-AE85

POS.	MIDWAY PART NUMBER
3C	E85B-12601-0000
3B	E85B-12602-0000
2C	E85B-12603-0000
2B	E85B-12604-0000
7J	E85B-12605-0000
8J	E85B-12606-0000
9J	E85B-12607-0000
10J	E85B-12608-0000
11D	E85B-12609-0000
12D	E85B-12610-0000

JUMPERS	IN	OUT
JW1		**
JW2		**
JW3	**	
JW4		**
JW5	**	
JW6		**
JW7	**	
JW8	**	
JW9	**	
JW10		**
JW11	**	
JW12		**

UNPROGRAMMED SOUNDS GOOD BOARD A084-91863-B000
PROGRAMMED SOUNDS GOOD BOARD A084-91863-AE85

POS.	MIDWAY PART NUMBER
U17	E85B-12611-0000
U7	E85B-12612-0000
U18	E85B-12613-0000
U8	E85B-12614-0000

JUMPERS	IN	OUT
JW1	**	
JW2	**	
JW3		**

M051-00E85-B008	REVISIONS
09-02-87	RELEASE FOR PRODUCTION

GLOSSARY OF UNIQUE TERMS AND ABBREVIATIONS

The following list of unique terms and abbreviations are used in the XENOPHOBE Parts & Operating Manual. Service Technicians and Operators should note that more than one description may apply to a particular term or abbreviation. Also, more than one term or abbreviation may apply to a particular description. Either way, the Technician or Operator need only be concerned with correctly matching the term or abbreviation with the corresponding description.

TERM/ABBREVIATION	DESCRIPTION
A,AD,ADDR	Address
AX	Axial
BD, BRD	Board
C	Capacitor, Common
CER	Ceramic
COM	Common
CONN	Connector
CPURST	CPU Reset
CR	Diode
CRBN	Carbon
D	Data, Diode
DAC	Digital-Analog Convertor
F	Fuse
FB	Ferrite Bead
HS	Heatsink
J	Connector, Plug
JW	Jumper Wire
MTG	Mounting
MTR	Meter
N.C.	Normally Closed
N.O.	Normally Open
PB	Push Button
PLY, PLYR	Player
PWR	Power
Q	Transistor, Silicon Controlled Rectifier (SCR), Darlington
R, RES, RM	Resistor
RTN	Return
SHLD	Shield
SND	Sound
SW	Switch
T	Transformer
W/MXR	With/Mixer
XSTR	Transistor
XTAL, Y	Crystal

SECTION 4 - APPENDIX

The following information consists of excerpts from the WELLS GARDNER SERVICE MANUAL for K7000 Monitors.

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VIDEO INTERFACE AND OUTPUT

The red, green, and blue video inputs come into the monitor at P1. Isolation and attenuation is provided by emitter followers Q1, Q2 and Q3. Forced blanking of the video signals is provided by the circuit of Q4, D5, D6, and D7. The forced blanking causes there to be an interruption in the video signal before it goes to the inputs of IC1. This interruption occurs between scan periods, while retrace is taking place; it is required by IC1. The forced blanking is not necessary for most video signals since they already have an interruption of video (blanking) between scan periods. Some do not; it is to accommodate such signals that the forced blanking circuit is included.

The red, green, and blue signals go into IC1 at pins 2, 4, and 6. Their levels are controlled by the gain of separate channels of the contrast amplifier. The gain is controlled by a DC voltage input to pin 11, which varies with the setting of the contrast control.

IC1 provides blanking of the video during retrace in response to blanking pulses at pin 13, derived from the horizontal and vertical sweep circuits. IC1 also requires a gating signal at pin 12 in order to provide red, green, and blue outputs at pins 21, 19, and 17. If the gating signal is not present, IC1 will not provide video output signals. The gating signal comes from IC2, pin 12 and is derived from horizontal sync.

The brightness is varied by varying the DC level of the outputs at pins 17, 19, and 21. This is accomplished by varying the DC voltage input to pin 14.

The video outputs from IC1 are provided via R30, R31, and R32 to the neck board where they are amplified by the video output stages Q201, Q202, and Q203 before being applied to the cathodes of the CRT through R10, R11, and R12.

SYNC

Sync is applied at P1 (positive sync) or at P2 (negative sync). Composite sync should be applied only to the horizontal sync input of the appropriate polarity. Positive sync is inverted by Q5 and Q6 then applied through D3, D4 and R51 to the sync amplifier Q7.

The sync amplifier output is applied through C22, R53, and R55 to pin 14 of IC2. Pin 14 is the sync separation input.

The sync separator extracts the horizontal and vertical sync from each other–providing horizontal sync to the horizontal AFC circuit in the IC. A composite sync output is provided at pin 12. This output signal is used for gating IC1 the video interface IC and for triggering the vertical oscillator.

HORIZONTAL OSCILLATOR AND OUTPUT

The horizontal AFC circuit of IC2 receives a horizontal sync input from the sync separator and a feedback signal at pin 1, derived from the horizontal output. Slight differences in frequency and phase of the two signals will cause the AFC to generate a correction voltage at pin 2.

The horizontal oscillator in IC2 has its free running frequency determined by the RC time constant of C19, R56, R57, R58, and VR2, the horizontal hold control. The horizontal hold control varies the horizontal frequency by varying the RC time constant. Slight correction in frequency is provided by a correction voltage at IC2, pin 3 which comes from pin 2 through R60.

The oscillator output at pin 4 is amplified and shaped by the horizontal drive stage Q10. The drive signal is then coupled to the base circuit of the horizontal output transistor Q11 by the horizontal drive transformer T2. T2 is used for impedance transformation to provide the Q11 base circuit with the low impedance source that it requires.

The horizontal output transistor Q11 is operated as a switch. It is either on or off. It is turned on and off at the scan rate which is determined by the horizontal oscillator frequency which is ultimately determined by the incoming horizontal sync frequency. A yoke current with a sawtooth waveform is needed to deflect the beam linearly across the CRT. The beam begins at the center of the CRT and is deflected from center to right. This center-to-right deflection occurs when Q11 is turned on. The deflection yoke coupling capacitor C38, also known as the S-shaping capacitor, begins to discharge through the yoke; the discharge current causes the beam to be deflected to the right CRT edge. At this time, Q11 is turned off, and the current provided by C38 stops. As the current falls to zero, a voltage is induced across the yoke windings as the magnetic field collapses; an oscillation is produced by the yoke windings and C36, the retrace tuning capacitor. During the first half cycle of oscillation, the induced voltage is impressed on the collector of Q11, C36, and the primary of they flyback transformer T1. This induced voltage is stepped up by the flyback transformer's secondary winding. This high voltage is then rectified and applied to the high voltage anode of the CRT. When this induced voltage occurs, the electron beam is deflected from the right edge of the CRT face to the left edge. This is called retrace. During the second half cycle of the oscillation (of C36 and the yoke windings), the voltage at the Q11 collector tries to go negative or below ground. When this happens, the damper diode (include in same package with Q11) becomes forward biased. The conduction of the damper diode allows energy stored in the horizontal system to decay linearly to zero, thus allowing the beam to return to the center of the CRT face.

The focus voltage and the screen, G2, voltage are obtained from the anode voltage with a resistor divider network within the T1 assembly. An auxiliary winding (pin 10) provides feedback to the horizontal AFC through R71, R70, and C29. This signal is also used to furnish the horizontal blanking input to IC1 via C28, R69, and R68. The signal from the auxiliary winding at pin 5 of T1 is rectified by D14 and filtered to provide the +12VDC supply for the video interface and sync circuits. The auxiliary winding of pins 3 and 4 produces a signal which is rectified by D13 and filtered to produce the +24VDC supply for the vertical output circuit.

The horizontal linearity coil L2 is a magnetically biased coil which shapes the yoke current for optimum linearity. The horizontal size coil L1 is a variable series inductor which is used to vary the horizontal size of the display.

HIGH VOLTAGE HOLD-DOWN CIRCUIT

The high voltage hold down circuit is part of the main PC board P447 of this monitor. The +12V DC supply is sensed via D10. Since the +12V DC supply is flyback pulse derived, the +12V DC supply will rise as the high voltage rises. If the +12V DC exceeds a threshold which is set with VR8, then D12 will conduct, thereby providing drive to IC2, pin 5–holddown input of deflection oscillator IC. The drive being applied to pin 5 causes the horizontal oscillator within the IC to shut down–thus preventing the generation of high voltage.

The horizontal oscillator will remain in its OFF state, even if the input to IC2, pin 5 is removed, unless and until AC power is removed from the monitor input. The power may then be reapplied.

VERTICAL OSCILLATOR AND OUTPUT

The composite sync ouput of IC2, pin 12 is filtered through the network of R65, C25, C24 and R66 so that only vertical sync is applied to the vertical trigger input at pin 11. The vertical oscillator frequency is controlled by the vertical hold control and its input to pin 10.

The vertical drive output at IC2, pin 7 is applied to pin 4 of IC3, the vertical output IC. Output current from IC3, pin 2 flows through the yoke to cause vertical deflection. During upward deflection, current flows out of pin 2, through the yoke, and into C50 to charge it. Downward deflection is caused by C50 discharging through the yoke in the opposite direction and back into IC3, pin 2. AC feedback is provided through the wiper of the vertical size control VR4 to IC2, pin 8 in order to control the drive amplitude. DC feedback at IC2, pin 9 maintains good vertical linearity at all sizes.

DC current from the +24V supply flows through R83 and through the yoke to provide downward raster shift. Some of this DC current is diverted from the yoke through the collector of Q9. The amount of this current which is diverted from the yoke can be varied by varying the base drive to Q9 by adjusting VR3, the vertical position control, thus providing manual adjustment of the vertical position of the display.

The drive signal at IC3, pin 2 is also used to furnish the vertical blanking input to IC1, pin 13 via R63 and C14.

AUTOMATIC DEGAUSSING ADG

The ADG circuit automatically demagnetizes the CRT. This circuit is activated only when the monitor is initially powered up after having been off for at least 20 minutes.

R105 is a positive temperature coefficient device. When it is cold, it has a very low resistance. As it gets warm, its resistance increases. If the monitor is cold when AC power is applied, then R105 with a low resistance allows current to pass through it, D23, D24, and the degaussing coil. As current flows through R105, it heats up and eventually has a very high resistance, allowing very little current to flow through it. The residual current now flowing through R105 produces a voltage drop across R104 of less than 0.6 volts. This is not enough to forward bias D23 and D24, so there is no current through the degaussing coil.

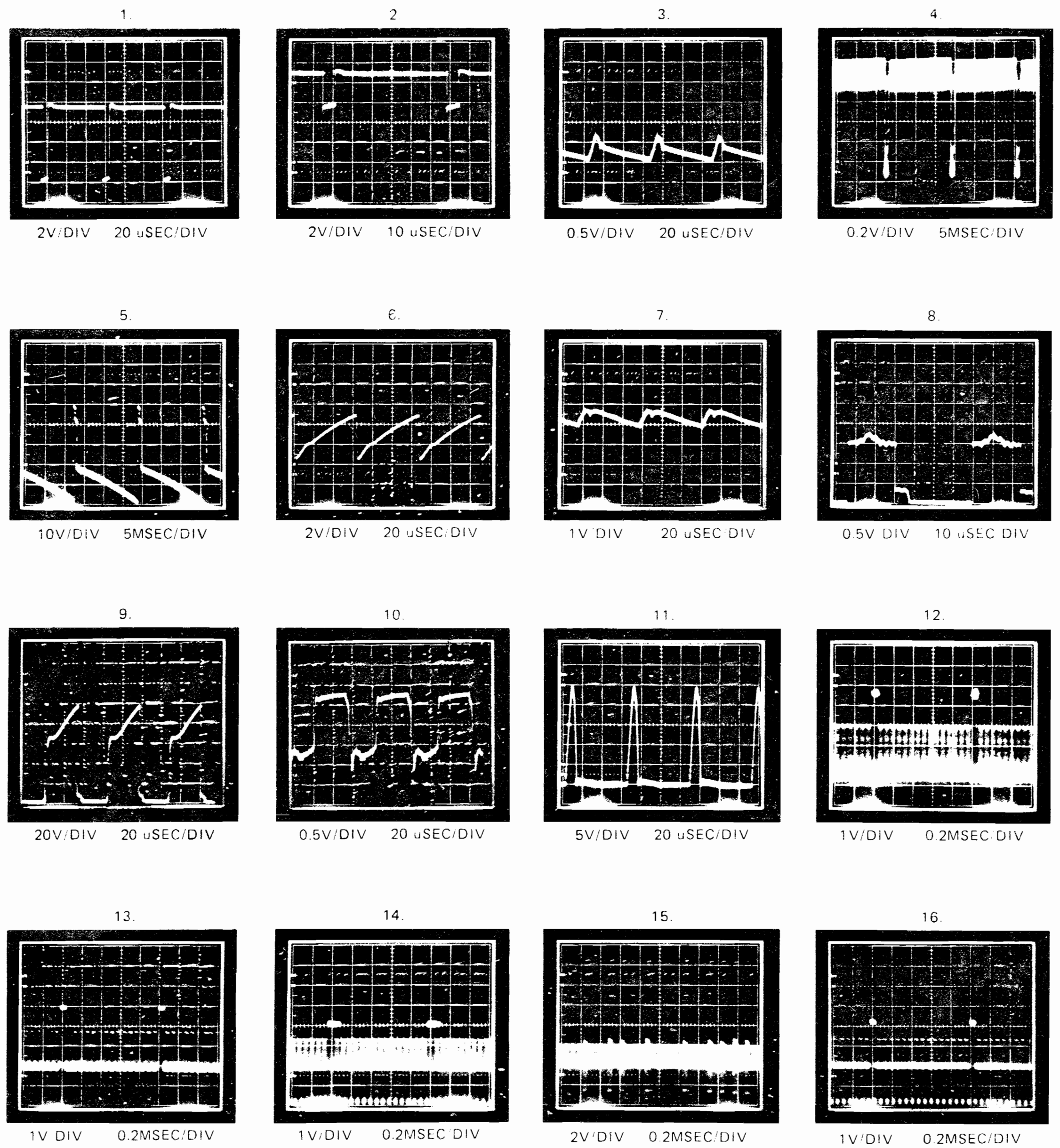
The process of initially having a large current through the degaussing coil and then having the current decay to zero is what produces the degaussing action. The degaussing current decays to zero before the CRT warms up, so the degaussing is completed before the picture comes on.

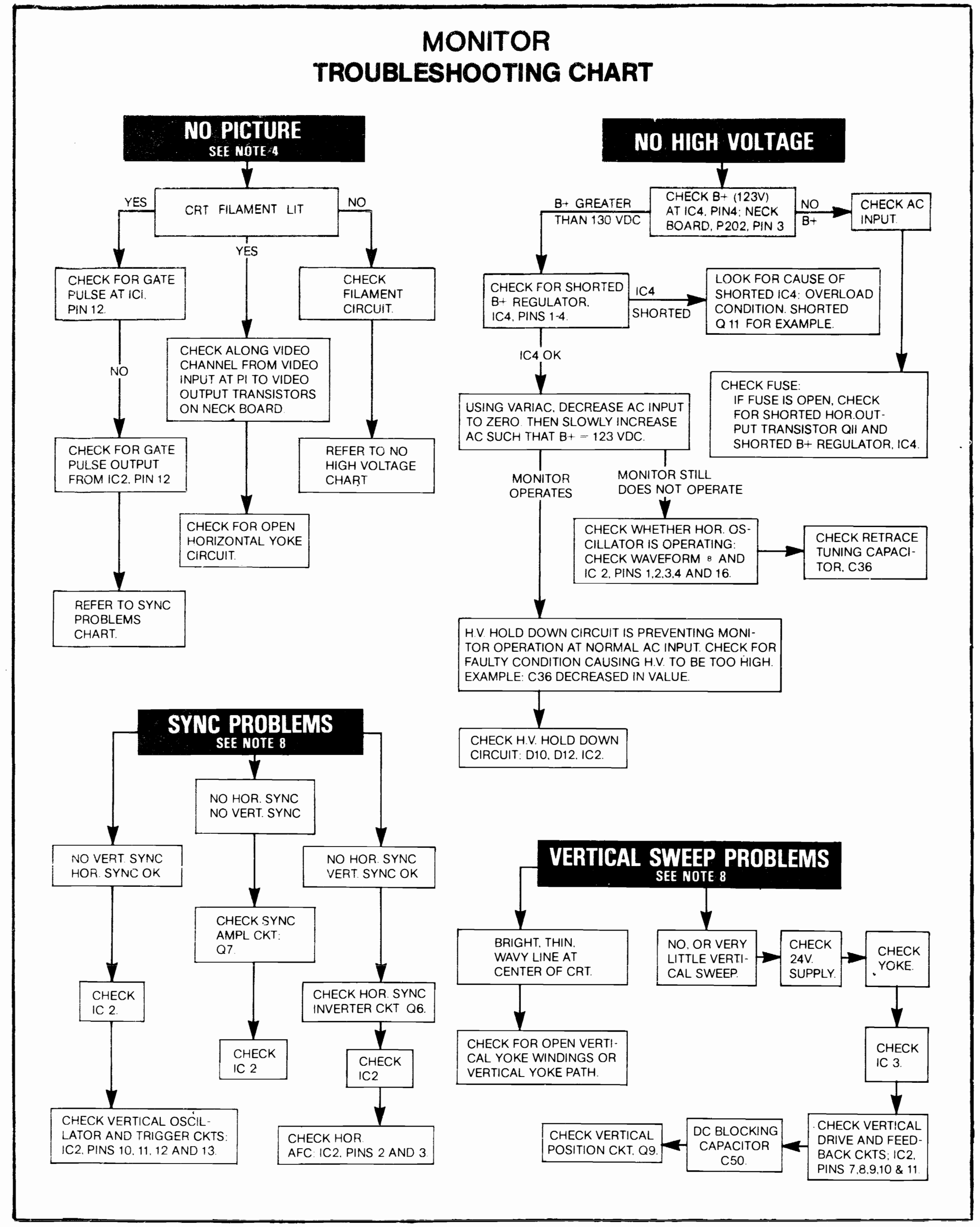
TYPICAL OSCILLOSCOPE WAVEFORM PATTERNS

The waveforms shown below were observed on a wide band oscilloscope. The input signal was from a crosshatch generator with a horizontal sync frequency of 15.73kHz and a vertical frequency of 60 Hz. If the waveforms are observed on an oscilloscope with a limited high frequency response, the corners of the pulses will tend to be more rounded than those shown, and the amplitude of any high frequency pulse will tend to be less.

Each photograph is numbered. These numbers correspond to the circled numbers on the schematic diagrams.

Photographs 12, 13, 14, 15 and 16 are of the red signal at various points along the red video channel. The waveforms at corresponding points along the green and blue video channels will look similar.





TROUBLESHOOTING NOTES

1. The troubleshooting chart mentions specific components to be checked. It is intended that the entire circuit associated with these components be checked.

2. This chart is a guide to servicing rather than a complete list of each component that could fail. Therefore, troubleshooting should not be limited only to those components mentioned in the chart.

3. It is always useful to begin checking a circuit by measuring the DC voltages and then comparing the measurements to those listed in the Typical DC Voltages chart.

4. The cutoff controls and drive controls on the neck board and the screen control at the bottom of the flyback transformer have been preset at the factory. When servicing the monitor for a lack of video, do not adjust any of these controls unless it is suspected that the problem is a result of these controls having been tampered with. Otherwise do not adjust these controls; if they are so severely out of adjustment that there is a lack of video, then there is something malfunctioning.

5. The Wells-Gardner Service Department does accept telephone calls for servicing assistance. Call 1-312-252-8220, between 7:00am and 3:30pm Central Time. Ask for the Service Department. The Service Department is closed during the first two weeks of July. Telephone assistance is not available during this period. Before calling, be sure to have available the model number of the monitor being serviced and the schematic diagram of the monitor being serviced.

6. Replacement parts may be ordered from the Service Department between 7:00am and 4:30pm Central Time.

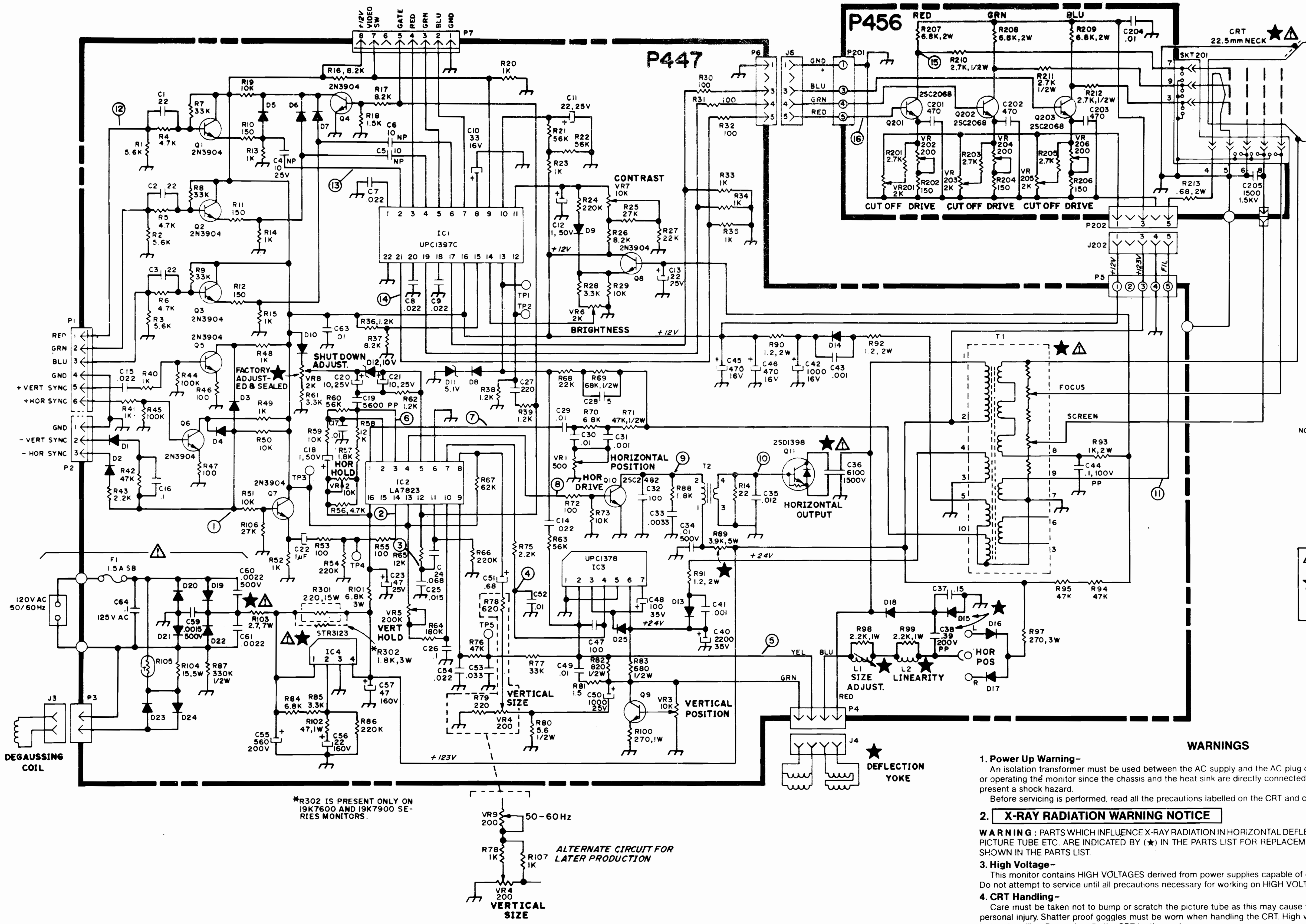
7. All monitors are equipped with automatic degaussing coils which demagnetize the picture tube every time the monitor is turned on after being off for a minimum of 20 minutes. Should any part of the chassis become magnetized it will be necessary to degauss the affected area with a manual degaussing coil. Move the coil slowly around the CRT face area and all surrounding metal parts. Then slowly withdraw for a distance of 6 feet before turning off.

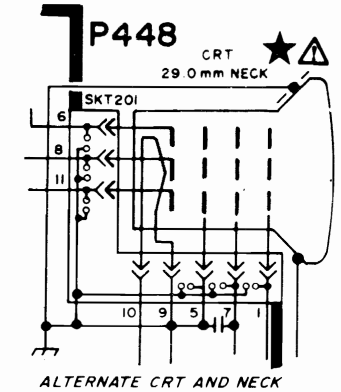
8. **Horizontal vs. Vertical:**

   Some models have the picture tube mounted vertically rather than horizontally. That is, the picture tube is mounted in the frame such that the long dimension of the tube is up and down. Examples of this include (but are not limited to) Models 13K7851 and 19K7951. Other than the physical orientation of the picture tube, there is no electrical difference between these models and their horizontal counterparts. The same circuits, the vertical circuits, produce and control deflection along the short dimension of the tube in all models.

   The same circuits, the horizontal circuits, produce and control deflection along the long dimension of the tube in all models. Therefore, wherever "vertical" appears in this manual or on the monitor, it refers to the short dimension of the picture tube; wherever "horizontal" appears, it refers to the long dimension of the picture tube.

K7000 COLOR MONITOR SCHEMATIC DIAGRAM





13K7800 SERIES
19K7600 SERIES
19K7900 SERIES

NOTE:
REFER TO OTHER SCHEMATIC DIAGRAMS FOR CERTAIN UNIQUE MODELS.

NOTES

1. ALL RESISTORS ARE IN OHMS, 1/4W, 5% UNLESS OTHERWISE INDICATED.
2. CAPACITANCE VALUES LESS THAN 1 ARE IN MICROFARADS. ABOVE 1 IN PICOFARADS UNLESS OTHERWISE INDICATED.
3. CIRCLED NUMBERS INDICATE LOCATIONS OF CERTAIN WAVEFORM READINGS.

△ CAUTION SAFETY CRITICAL COMPONENT
★ X-RAY RADIATION RELATED COMPONENT
REPLACE ONLY WITH SAME TYPE PARTS AS SHOWN IN PARTS LIST.

WARNINGS

1. Power Up Warning–

An isolation transformer must be used between the AC supply and the AC plug of the monitor before servicing, testing, or operating the monitor since the chassis and the heat sink are directly connected to one side of the AC line which could present a shock hazard.

Before servicing is performed, read all the precautions labelled on the CRT and chassis.

2. X-RAY RADIATION WARNING NOTICE

WARNING: PARTS WHICH INFLUENCE X-RAY RADIATION IN HORIZONTAL DEFLECTION, HIGH VOLTAGE CIRCUITS AND PICTURE TUBE ETC. ARE INDICATED BY (★) IN THE PARTS LIST FOR REPLACEMENT PURPOSES. USE ONLY THE TYPE SHOWN IN THE PARTS LIST.

3. High Voltage–

This monitor contains HIGH VOLTAGES derived from power supplies capable of delivering LETHAL quantities of energy. Do not attempt to service until all precautions necessary for working on HIGH VOLTAGE equipment have been observed.

4. CRT Handling–

Care must be taken not to bump or scratch the picture tube as this may cause the picture tube to implode resulting in personal injury. Shatter proof goggles must be worn when handling the CRT. High voltage must be completely discharged before handling. Do not handle the CRT by the neck.

5. PRODUCT SAFETY NOTICE

WARNING: FOR CONTINUED SAFETY REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER RECOMMENDED PARTS. THESE PARTS ARE IDENTIFIED BY SHADING AND BY (△) ON THE SCHEMATIC DIAGRAM.

AVERTISSEMENT: POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT.

For replacement purposes, use the same type or specified type of wire and cable, assuring the positioning of the wires is followed (especially for H.V. and power supply circuits). Use of alternative wiring or positioning could result in damage to the monitor or in a shock or fire hazard.

GENERAL REPLACEMENT PARTS LIST

For all K7000 models except where noted.

This monitor contains circuits and components included specifically for safety purposes.

For continued protection no changes should be made to the original design, and components shown in shaded areas of schematic, or ⚠★ on parts list should be replaced with exact factory replacement parts.

The use of substitute parts may create a shock, fire, radiation or other hazard. Service should be performed by qualified personnel only.

P447 MAIN BOARD

RESISTORS

Ref. No.	Part No.	Description
R1	340X2562-934	5.6K Ohm 5% 0.25W
R2	340X2562-934	5.6K Ohm 5% 0.25W
R3	340X2562-934	5.6K Ohm 5% 0.25W
R4	340X2472-934	4.7K Ohm 5% 0.25W
R5	340X2472-934	4.7K Ohm 5% 0.25W
R6	340X2472-934	4.7K Ohm 5% 0.25W
R7	340X2333-934	33K Ohm 5% 0.25
R8	340X2333-934	33K Ohm 5% 0.25
R9	340X2333-934	33K Ohm 5% 0.25
R10	340X2151-934	150 Ohm 5% 0.25W
R11	340X2151-934	150 Ohm 5% 0.25W
R12	340X2151-934	150 Ohm 5% 0.25W
R13	340X2102-934	1.0K Ohm 5% 0.25W
R14	340X2102-934	1.0K Ohm 5% 0.25W
R15	340X2102-934	1.0K Ohm 5% 0.25W
R16	340X2822-934	8.2K Ohm 5% 0.25W
R17	340X2822-934	8.2K Ohm 5% 0.25W
R18	340X2152-934	1.5K Ohm 5% 0.25W
R19	340X2103-934	10K Ohm 5% 0.25W
R20	340X2102-934	1.0K Ohm 5% 0.25W
R21	340X2563-934	56K Ohm 5% 0.25W
R22	340X2562-934	5.6K Ohm 5% 0.25W
R23	340X2102-934	1.0K Ohm 5% 0.25W
R24	340X2224-934	220K Ohm 5% 0.25W
R25	340X2273-934	27K Ohm 5% 0.25W
R26	340X2822-934	8.2K Ohm 5% 0.25W
R27	340X2223-934	22K Ohm 5% 0.25W
R28	340X2332-934	3.3K Ohm 5% 0.25W
R29	340X2103-934	10K Ohm 5% 0.25W
R30	340X2101-934	100 Ohm 5% 0.25W
R31	340X2101-934	100 Ohm 5% 0.25W
R32	340X2101-934	100 Ohm 5% 0.25W
R33	340X2102-934	1.0K Ohm 5% 0.25W
R34	340X2102-934	1.0K Ohm 5% 0.25W
R35	340X2102-934	1.0K Ohm 5% 0.25W
R36	340X2122-934	1.2K Ohm 5% 0.25W
R37	340X2822-934	8.2K Ohm 5% 0.25W
R38	340X2122-934	1.2K Ohm 5% 0.25W
R39	340X2122-934	1.2K Ohm 5% 0.25W
R40	340X2102-934	1.0K Ohm 5% 0.25W
R41	340X2102-934	1.0K Ohm 5% 0.25W
R42	340X2473-934	47K Ohm 5% 0.25W
R43	340X2222-934	2.2K Ohm 5% 0.25W
R44	340X2104-934	100K Ohm 5% 0.25W
R45	340X2104-934	100K Ohm 5% 0.25W
R46	340X2101-934	100 Ohm 5% 0.25W
R47	340X2101-934	100 Ohm 5% 0.25W
R48	340X2102-934	1.0K Ohm 5% 0.25W
R49	340X2102-934	1.0K Ohm 5% 0.25W
R50	340X2103-934	10K Ohm 5% 0.25W
R51	340X2103-934	10K Ohm 5% 0.25W
R52	340X2102-934	1.0K Ohm 5% 0.25W
R53	340X2151-934	150 Ohm 5% 0.25W
R54	340X2224-934	220K Ohm 5% 0.25W
R55	340X2101-934	100 Ohm 5% 0.25W
R56	340X2472-934	4.7K Ohm 5% 0.25W
R57	340X2182-934	1.8K Ohm 5% 0.25W
R58	340X2123-934	12K Ohm 5% 0.25W

RESISTORS (Cont.)

Ref. No.	Part No.	Description
R59	340X2103-934	10K Ohm 5% 0.25W
R60	340X2563-934	56K Ohm 5% 0.25W
R61	340X2332-934	3.3K Ohm 5% 0.25W
R62	340X2122-934	1.2K Ohm 5% 0.25W
R63	340X2563-934	56K Ohm 5% 0.25W
R64	340X2184-934	180K Ohm 5% 0.25W
R65	340X2123-934	12K Ohm 5% 0.25W
R66	340X2224-934	220K Ohm 5% 0.25W
R67	340X2623-934	62K Ohm 5% 0.25W
R68	340X2223-934	22K Ohm 5% 0.25W
R69	340X3683-231	68K 5% 0.5W CAR
R70	340X2682-934	6.8K Ohm 5% 0.25
R71	340X3473-234	47K 5% 0.5W
R72	340X2101-934	100 Ohm 5% 0.25W
R73	340X2103-934	10K Ohm 5% 0.25W
R74	340X2220-934	22 Ohm 5% 0.25W
R75	340X2222-934	2.2K Ohm 5% 0.25W
R76	340X2473-934	47K Ohm 5% 0.25W
R77	340X2333-934	33K Ohm 5% 0.25
R78	340X2102-934	1.0K Ohm 5% 0.25W
R80	340X3056-934	5.6 5% 0.5W
R81	340X2150-934	15 Ohm 5% 0.25W
R82	340X3821-934	820 Ohm 5% 0.5W
R83	340X3681-934	680 Ohm 5% 0.5W
R84	340X2682-934	6.8K Ohm 5% 0.25
R85	340X2332-934	3.3K Ohm 5% 0.25W
R86	340X2224-934	220K Ohm 5% 0.25W
R87	340X3334-844	330K 10% 0.5W
R88	340X4182-633	1.8K 5% 1W
★R89	043X0476-002	3.9K 5% 5W MO
R90	043X0486-002	1.2 5% 2W MF
R91	043X0486-002	1.2 5% 2W MF
R92	043X0486-002	1.2 5% 2W MF
R93	420X5102-324	1.0K 5% 2W
R94	340X2473-934	47K Ohm 5% 0.25W
R95	340X2473-934	47K Ohm 5% 0.25W
R96	420X6182-325	1.8K Ohm 5% 3W, WW
R97	420X6271-325	270 5% 3W
R98	340X4222-633	2.2K Ohm 5% 1W
R99	340X4222-633	2.2K Ohm 5% 1W
R100	340X4271-633	270 5% 1W
R101	420X6682-325	6.8K 5% 3W
R102	340X4470-633	47 5% 1W
⚠★R103	043X0483-001	2.7 Ohm 5% 7W
R104	043X0484-001	15 Ohm 5% 5W
R105	043X0485-001	Thermister
R106	340X2273-934	27K Ohm 5% 0.25W
R107	340X2102-934	1.0K Ohm 5% 0.25W
R301	043X0481-003	220 Ohm 15W WW
VR1	040X0653-002	CTRL 500
VR2	040X0653-005	CTRL 10K
VR3	040X0653-005	CTRL 10K
VR4	040X0653-001	CTRL 200
VR5	040X0653-006	CTRL 200K
VR6	040X0653-003	CTRL 2K
VR7	040X0653-005	CTRL 10K
★VR8	040X0639-006	Trim Pot 2K Ohm 0.3W
VR9	040X0655-001	Trim Pot 200 Ohm

FINAL ASSEMBLY PARTS

Ref. No.	Part No.	Description
	13K7800 SERIES (13")	
⚠★	88X0236-506	CRT Orion A34JLL00X
★	9A2860-001	Deflection Yoke
	2A0690-001	Purity & Convergence Ring Assembly
	9A2856-001	Degaussing Coil Assembly
	8X0378-001	Rubber Wedge
	19K7600 and 19K7900 SERIES (19")	
⚠★	88X0237-506	CRT Philips MVA48ABK05X
★	9A2862-001	Deflection Yoke
	2A0690-001	Purity & Convergence Ring Assembly
	9A2857-001	Degaussing Coil Assembly
	208X2400-901	Rubber Wedge

P447 MAIN BOARD (CONT.)

CAPACITORS

Ref. No.	Part No.	Description
C1	080X0099-671	Disc 22PF 10% NPO
C2	080X0099-671	Disc 22PF 10% NPO
C3	080X0099-671	Disc 22PF 10% NPO
C4	045X0577-501	Elect 10MF NP 25V
C5	045X0577-501	Elect 10MF NP 25V
C6	045X0577-501	Elect 10MF NP 25V
C7	047X0786-502	MYR .022 10% 50V
C8	047X0786-502	MYR .022 10% 50V
C9	047X0786-502	MYR .022 10% 50V
C10	045X0560-531	Elect 33MF 16V
C11	045X0560-534	Elect 22MF 25V
C12	045X0560-514	LYT 1.0UF 50V
C13	045X0560-534	Elect 22MF 25V
C14	047X0786-502	MYR .022 10% 50V
C15	047X0786-502	MYR .022 10% 50V
C16	047X0786-511	MYR .1 10% 50V
C17	047X0786-501	.010UF 10% 50V P-Estr
C18	045X0560-514	LYT 1.0UF 50V
C19	046X0550-502	PP .0056 2% AWS 50V
C20	045X0560-518	LYT 10UF 25V
C21	045X0560-518	LYT 10UF 25V
C22	045X0560-514	LYT 1.0UF 50V
C23	045X0560-517	LYT 47UF 25V
C24	047X0786-503	MYR .068 10% 50V
C25	047X0786-512	P-Ester .015 10% 50V
C26	047X0786-511	Myr .1 10% 50V
C27	080X0099-557	Disc 220 10% Z5F
C28	080X0098-048	5PF 20% 2KV NPO
C29	047X0786-501	.010UF 10% 50V P-Estr
C30	080X0099-505	Disc .001 20% Z5F 500V
C31	047X0786-501	.010UF 10% 50V P-Estr
C32	080X0099-580	Disc 100 10% Z5F 500V
C33	080X0099-722	Disc .0033 10% Y5P 500V
C34	080X0099-221	Disc .01 10% Y5P 500V
C35	047X0786-501	.010UF 10% 50V P-Estr
⚠★C36	046X0551-003	PP 6100 2% 1500V
C37	046X0544-005	.15 100V PF
★C38	046X0536-046	.39UF 5% 200V PP
C40	045X0560-033	Elect 2200 35V
C41	080X0099-505	Disc .001 20% Z5F 500V
C42	045X0560-006	LYT 1000UF 16V
C43	080X0099-505	Disc .001 20% Z5F 500V
C44	046X0544-009	.1 10% 100V P-Prop
C45	045X0560-020	LYT 470UF 16V
C46	045X0560-020	LYT 470UF 16V
C47	080X0099-580	Disc 100 10% Z5F 500V
C48	045X0560-532	Elect 100MF 35V
V49	047X0786-501	.010UF 10% 50V P-Estr
C50	045X0560-023	LYT 1000UF 25V
C51	045X0525-512	Tan .68 10% 35V
C52	047X0786-501	.010UF 10& 50V P-Estr
C53	047X0786-514	.033UF 5% 50V P-Estr
C54	047X0786-515	MYR .022 5% 50V
C55	045X0578-001	Elect 560 200V
C56	045X0569-008	LYT 22UF 160V
C57	045X0569-011	Elect 47 160V
⚠ C59	080X0099-724	Disc .0015 10% Y5P 500V
⚠ C60	080X0099-723	Disc .0022 10% Y5P 500V
⚠ C61	080X0099-723	Disc .0022 10% Y5P 500V
⚠ C62	046X0552-001	.1 20% 125VAC
C63	047X0786-501	.010UF 10% 50V P-Estr

SEMICONDUCTORS

Ref. No.	Part No.	Description
D1	066X0070-001	Diode 1N914B
D2	066X0070-001	Diode 1N914B
D3	066X0070-001	Diode 1N914B
D4	066X0070-001	Diode 1N914B
D5	066X0070-001	Diode 1N914B
D6	066X0070-001	Diode 1N914B
D7	066X0070-001	Diode 1N914B
D8	066X0070-001	Diode 1N914B
D9	066X0070-001	Diode 1N914B
D10	066X0070-001	Diode 1N914B
D11	066X0040-028	Zener Diode 5.1V 5% 0.5W
D12	066X0040-005	Zener Diode 10V 5% 0.5W
D13	066X0090-001	D1 Fast SW RU-2
D14	066X0090-001	D1 Fast SW RU-2
★D15	066X0090-001	D1 Fast SW RU-2
D16	066X0090-001	D1 Fast SW RU-2
D17	066X0090-001	D1 Fast SW RU-2
D18	066X0084-001	Diode Sanyo GFE10R
⚠ D19	066X0091-001	Diode SI 1A 600V
⚠ D20	066X0091-001	Diode SI 1A 600V
⚠ D21	066X0091-001	Diode SI 1A 600V
⚠ D22	066X0091-001	Diode SI 1A 600V
D23	066X0091-001	Diode SI 1A 600V
D24	066X0091-001	Diode SI 1A 600V
D25	066X0089-001	D1 Boost
Q1	086X0113-501	TRSTR NPN 2N3904
Q2	086X0113-501	TRSTR NPN 2N3904
Q3	086X0113-501	TRSTR NPN 2N3904
Q4	086X0113-501	TRSTR NPN 2N3904
Q5	086X0113-501	TRSTR NPN 2N3904
Q6	086X0113-501	TRSTR NPN 2N3904
Q7	086X0113-501	TRSTR NPN 2N3904
Q8	086X0113-501	TRSTR NPN 2N3904
Q9	086X0113-501	TRSTR NPN 2N3904
Q10	086X0185-501	TRSTR NPN CC
Q11	086X0190-001	TRSTR 2SD1398
IC1	086X0186-001	IC Video UPC1397 NEC
IC2	086X0187-001	IC Horiz Vert LA7823
IC3	086X0189-001	IC Vert Output UPC1378
⚠★IC4	086X0188-001	Regulator IC STR3123

TRANSFORMERS AND COILS

Ref. No.	Part No.	Description
★L1	009A2854-001	Coil Width-TODAI
★L2	009A2855-001	Coil Lin–TODAI
⚠★T1	053X0528-001	Transf Flyback
T2	052X0131-001	Transf-Horiz Driver

MISCELLANEOUS

Ref. No.	Part No.	Description
⚠ F1	016X0176-001	Fuse 1.5A SB
	016X0182-001	Fuse Clip
P1	006A0428-001	Plug Header
P2	006A0428-001	Plug Header
P3	006A0427-001	Plug 2 Pin
P4	006A0406-001	Plug 4-Pin OSHIMA
P6	006A0429-005	Plug Header
J202	013X1243-001	Cable Assy 4 Wire 350mm

P456 NECK BOARD (used with CRT's with a 22.5mm neck diameter)

RESISTORS

Ref. No.	Part No.	Description
R201	340X2272-934	Res 2.7K Ohm 5% 0.25W
R202	340X2151-934	Res 150 Ohm 5% 0.25W
R203	340X2272-934	Res 2.7K Ohm 5% 0.25W
R204	340X2151-934	Res 150 Ohm 5% 0.25W
R205	340X2272-934	Res 2.7K Ohm 5% 0.25W
R206	340X2151-934	Res 150 Ohm 5% 0.25W
R207	340X5682-633	Res 6.8K 2W MO
R208	340X5682-633	Res 6.8K 2W MO
R209	340X5682-633	Res 6.8K 2W MO
R210	340X3272-244	Res 2.7K Ohm 10% 0.5W
R211	340X3272-244	Res 2.7K Ohm 10% 0.5W
R212	340X3272-244	Res 2.7K Ohm 10% 0.5W
R213	340X5689-333	Res .68 Ohm 5% 2W
VR201	040X0653-003	CTRL 2K
VR202	040X0653-001	CTRL 200
VR203	040X0653-003	CTRL 2K
VR204	040X0653-001	CTRL 200
VR205	040X0653-003	CTRL 2K
VR206	040X0653-001	CTRL 200

CAPACITORS

Ref. No.	Part No.	Description
C201	080X0090-006	Cap 470PF 10% Z5F CER
C202	080X0099-006	Cap 470PF 10% Z5F CER
C203	080X0099-006	Cap 470PF 10% Z5F CER
C204	080X0099-221	C Disc .01 10% Y5P 500V
C205	080X0099-225	C Disc .0015 1.5KV

SEMICONDUCTORS

Ref. No.	Part No.	Description
Q201	086X0184-001	TRSTR 2SC2068LB/LBBK
Q202	086X0184-001	TRSTR 2SC2068LB/LBBK
Q203	086X0184-001	TRSTR 2SC2068LB/LBBK

MISCELLANEOUS

Ref. No.	Part No.	Description
P202	006A0429-005	Plug Header
SKT201	003A0636-001	Pix Socket
J6	013X1243-001	Cable Assy 4 Wire 350mm
	030X0797-001	Plug V Pin

P448 NECK BOARD (Used with CRT's with a 29mm neck diameter)

Same as P456 NECK BOARD except:

SKT201	003A0651-001	SOC CRT